DOMESTIC ENGINEERING

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The Editor's Christmas Greeting

Reader, let's have just a cozy chat, you and I. All through the year I have been pounding at something, trying all the time to focalize in expression some thoughts that you or your brethren in the trade have given me. You have been good enough to tell me at odd times that the work has been fairly well done. Now this is the last time I will be able to address you in 1911 and I want you all to myself just for a few hundred words and then I will quit and welcome you with the regular editorial glad-hand of the 1912 New Year.

Reader—manufacturer, jobber, plumber, steamfitter, plumbing inspector, or sanitary engineer—I care not which of these you are, I want your personal attention. Just so long as you are a man with the red blood of courage to accomplish for the joy of doing, you are the man I want to talk to.

I want to report to you a steady and notable increase of sanitarian firebrands during the past year. You will be glad to know this. I am going to see to it early next year that you are supplied with a list of those who are "doing things" in sanitation's cause.

I am not referring to wire-pullers, platform-megaphonists or the newly self-maders. I mean the class of man who, each day, devotes his life to the best application of the knowledge that he has acquired.

I mean the type of man who always reserves for himself the privilege of revising his opinions day by day if necessary and will at call reject his most cherished belief without regret when confronted with the facts proving its falsity.

That type of man is rare. I want to belong to that type all through 1912. Do you? If you do, write me a personal letter and I will admit you to the Inner Sanitary Circle. There is one. Perhaps you did not know it. You can belong, if your mental attitude is right.

You and I have to work out the problems of the New Year together. If we do not do it, we will ever be groaning at the burden of the problems.

The problems of 1912 are solved already if we all will that they shall be. Reports from all parts of the United States reveal our great national underlying strength. This can only be sapped by our allowance of political meddling with our commercial affairs. This meddling has got to stop. Politics have to be relegated to the shelves of the antiquarians. We live by Business and Business must supplant all political jugglery. Good Business, Honest Business, Business that respects the livelihood of the neighbor, Business that declares a constant dividend, the Business of the Square Deal. And when I say "Square Deal," I mean one that applies to all men regardless of their union, non-union, association, non-association or other business affiliations. I believe in the Business of the Square Deal—one that will fight for the square deal for yourself and also for the square deal for everyone else.

Belief is no good without action; faith is dead without works. If you subscribe to the above belief, will you talk it at your next meeting? Will you read this brief Xmas talk? Will you induce several others to start something for the betterment of conditions? If you don't know what to start, write to me about it, telling me what your conditions are and what you have to overcome.

Get wise to one thing now. It is a case of Self-Dedication and we must start our work for 1912 as soon as the last stroke of the Christmas-Eve bell has disappeared into the Past. There is an immense work to do. All that you need and all that I need is to start something. Attending association meetings is good medicine but you are not working at maximum association efficiency unless you **yourself** are working. It's no use grumbling at conditions. What we need is Power and we can have it if we work for it and claim it. We can change conditions at will.

I wish you all a very happy Christmas and a most prosperous New Year. You and I have the power to make 1912 the happiest and most profitable year in our lives. Start smiling for 1912 NOW. Take the smile home with you. The wife and children may need it also.

THE PLUMBER'S CHRISTMAS.

By Harry Gale Nye.

Written expressly for "Domestic Engineering."

Few plumbers were born with a silver-spoon in their mouth. Most of them were poor boys, and it takes a man who was a poor boy to enjoy Christmas. Giving means very little to one who has plenty and getting means even less to the satiated. But the man who was a poor boy never forgets the joy of Santa Claus. As a man grows older he thinks more and more of the Christmases of his youth and if the delight of receiving was strong in him then, the recollection of pleasures gone by are renewed in the Christmases of his old age. Yes, the plumber who was a poor boy has a much better Christmas time than the fellow who merely got bonds and stocks on his Christmas tree when he was a lad. Why, a pair of skates, a sled with a race-horse painted on the top of it, a pair of red mittens, has made a chaos of happiness in the heart of many a boy who today is a plumber! And as the season of peace-on-earth, good-will-to-men approaches, he lives over again the days when mother sent him away to the Sunday-School Christmas tree early that she might prepare for him a bit of a surprise at home. All unbeknown to him father had been out in the woods and had cut a small scrub oak. With loving hands father and mother had decorated it. There were strings of popcorn, red apples and cheap candy, but how delicious to the boy whose taste was not cultivated to costly bonbons! There were tinsels, candles, and the few presents that the family could afford, a cheap meager little Christmas tree it was, but what a wonderful, Christmas tree to the poor boy who came home from the Sunday-School tree wondering why it was that everybody got so many presents while he seemed to have been forgotten!

And because the plumber was a poor boy and experienced the real joys of Christmas time, he can the better make happy his own boy at the coming holiday time, for he really understands what Christmas means. And mother knows, too, even better than father for she was a poor girl and extravagances were not known to her at Christmas time any more than they were to father. When she married father he was a struggling plumber working by the day. She knows what real hardships are, what inclinations one must forebear, what tastes one must deny, what little pleasures forego, that a home may be built up and the children of that home fare a little better than did she in the days of old. Together father and mother have worked out their own salvation and the salvation of their children. They have been poor together and despite this have been happy in their poverty. And because they have been tried in the fire of life, and because the metal in them was good, they can the more thoroughly enjoy Christmas, for they really and truly understand its importance.

The rich man knows nothing of the fine sensibilities they possess, regarding this grand holiday. He cannot possibly know the joy that comes to them in its observance. He cannot possibly feel the thrill that they feel because of it. He does not understand. He does not know what it is to want things, and finally, after months and years of working and saving, to get them. He cannot know the real enjoyment of possession as can they. Yes, I know that Christmas to the plumber and his wife is a time of real appreciation, a period of real happiness, a calm when they can look back and laugh at the storm.

A Merry Christmas to all "Domestic Engineering's" readers, and may your hearts be as filled with joy as are the stockings of your children with presents!

THE PLUMBER AND THE LIGHTING TRADE.

No denial has ever been made of the statement that gas-lighting goods has always proved to be a profit-bearing line for plumbers, and expecially those who are eager to develop a good trade on something besides their general line of business.

It is also known that these goods create a profit of from 50 to 75 per cent, and frequently the profits on the portables run from 75 to 100 per cent.

One of the best portables to be brought out this season is that made entirely of glass—the standard and the shade. Both are of heavy figured pressed glass, and the price at which this item can be bought at the factory will surprise all dealers. To sell this portable at $4 will give the dealer a profit of 125 per cent.

In the shade lines, for both upright and inverted use, now many new shapes are being shown for the winter trade, but there is a host of new treatments, all of which are far in advance of anything heretofore shown. There is a continuous demand, for this class of goods. The line is clean, requires but a comparatively small amount of shelf space and is salable the year round, the demand of course being largest during the fall and winter months. On mantles, globes and shades the sale is steady, particularly on mantles, and if an assortment is carried covering all requirements they take on considerable importance.

As these goods are not universally found in plumbing stores, it is well to have them up to the front, so that every one entering the store will see that they are kept in stock. It is very desirable to have a large pipe, supplied with gas, over the counter or near where the goods are kept, to which various kinds of burners and lights can be permanently attached. This arrangement will be found invaluable in showing off the various lights and globes to customers, who can then make intelligent choice.

The assortment of the various kinds of goods can be proportioned to the demand, but a large variety of whatever goods are carried is as much of a drawing card as in any other line. The reputation of being headquarters in the town for gas-light goods is also valuable.

The following list of articles will give an idea of an assortment of gas-light goods which will be found very complete and can advantageously be bought by a plumber who contemplates putting in a stock:

Common burners and tips.

Mantles, to retail for 10, 15, 20, 25, 30 and 35 cents.

Globes for upright lights—clear, frosted and opal.

Globes for inverted lights—yellow, green, ruby, clear, frosted and opal.

Chandelier and bracket globes.

Upright lights. Junior lights. Mica chimneys.
Inverted lights. Pilot lights. Mica canopies.
Hall lights. Glass chimneys. Gas portables.

An assortment of portables, somewhat better than those carried during the balance of the year, make a valuable addition to goods for the Christmas period.

There is a mantle for inverted lights, made in Germany, which has recently been introduced into this country. This is collapsible, not stiff, and retails from 15 to 20 cents.

A good plan for keeping mantles is to put them in the regular shelving with thin wood movable partitions separating the various kinds. A small strip of cardboard, with name and price, can be tacked above each kind, thus avoiding confusion. Manufacturers generally make good all mantles broken in transit.

Climbing the Ladder

By "Noswad"

Chapter V.

Four years ago I was in a big city. It was during the panic year, in the winter, work was scarce, men were trying to buy jobs, I had been laid off a week and had just obtained a job in an auto factory to tide me over until trade revived. While there one of my friends told me of a job in a country town some eighty miles away. I hardly liked the idea of going to a country-town, but he told me he knew the boss personally and that he was a particularly nice man. He garanteed me a steady job without lay-offs, and this fetched me. I had gotten tired of roaming around, so I decided to go and try it.

I found the boss to be all that my friend had said he was, and more, a perfect gentleman. It was a pleasure to work for such a man, to me especially so, after the class of men I had mostly run up against in the last few years. There was only one man in the shop. The boss told me he had been having all kinds of trouble with poor mechanics and that his customers were always kicking and sending for the men to fix up jobs time and again after the jobs were finished. There was a good class of trade to be done in the town, if he could get good men to handle the work. I told him I would do my best, and settled down to do it. To start with there were two of us, but the last two years I have been running seven or eight men all the time, and we have certainly done some fine jobs. The job we are engaged on at the present time will run to almost $3,000.

I well remember one of the first repair jobs I did. I was called across to one of the barber shops to repair a leak in a hot-water supply-pipe. It was a good fixture with several bowls, the nickel-plated supply-pipe went to wall, and had been wiped into a half inch supply pipe of lead, with a flange joint, the joint had broken away, the fixture having been in use ten or twelve years. I had already ordered some solder so was prepared to do the job right away. I went to work and in a short time wiped in the joint.

The proprietor watched me do the job. When it was done he said: "Gee, that's slick. Three different men came to look at that job this morning and each one gave it up, so I said, I will send for that city man and see if he can do it, and you have. Say, boy, that little job will make you in this town." He certainly gave me a lot of advertising, and he has been one of my best friends ever since.

Last year he remodeled his house, and I did the plumbing in it. This year his partner has built a fine home and I have installed the plumbing and heating—all from one little repair job that pleased them. It pays to do every little job well. One never knows what good work it is going to bring into the shop. What appeared a tricky job to them was really only a very simple one, as you mechanics will know. The first year we had several good plumbing installations, one of which I show, roughed in with lead and wiped joints. The picture shows the bath-room on the second floor, there is another bath-room immediately underneath this, as you will see by the vent pipes.

The picture, Fig. 1, will talk for itself, so I need not explain it. In one job of this description there were over 40 wiped-joints. Now I have almost given up this class of work and install a combination of the Durham system of my own design, using cast-iron soil-pipe and a special revented fitting, with separate openings for the toilet, lavatory and bath-tub, using wrought-iron galvanized pipe and recessed cast fittings and a 4 x 8 in. brass bath-trap of the latest type and with a scouring feature. The bath-tub and lavatory in this system will not syphon if 1½-in. pipe is used, even if they are placed 10 ft. away from the stack. I, however, try to get the toilet right on to the stack. It is not therefore absolutely necessary to revent the lavatory, but I invariably revent the lavatory in a new house as it makes the water waste away noiselessly, which is a great advantage. In an old house where it would mean a lot of

Fig. 1

expense to revent this fixture, not being necessary, I omit it. The special three-way fitting I use, I buy on the open market and same can be purchased through any jobber.

Here is a picture of one of my early installations of this class of work, Fig. 2. You will notice the bath-trap is of the running type. This I have discarded some time ago for the 4-in. brass trap I mentioned above. It is almost impossible to syphon this trap. It is only under some very extraordinary circumstance that I vent this fixture. I had several reasons for giving up the lead and wiped-joint work. I had nails driven through the lead-pipe on three different installations by the carpenters, the floors had to be ripped up and repairs made. In one instance part of a tile floor had to be torn up, and it cost that contractor quite a few dollars to fix up after the repair was made, and it gave us a lot of trouble to find the leak and tear up that floor and fix the nail-hole. I also felt that a lot of the work in the old lead work was unnecessary with its intri-

cate venting and reventing, the pipes of which were often rendered useless after a few years by being stopped up with dirt, so that sooner or later the job was rendered unsanitary. What was the use when a more simple job would do the work in an absolutely reliable and perfect manner, at less expense to the customer, and with not a useless pipe on the job? I also argued that the cheaper a first-class job

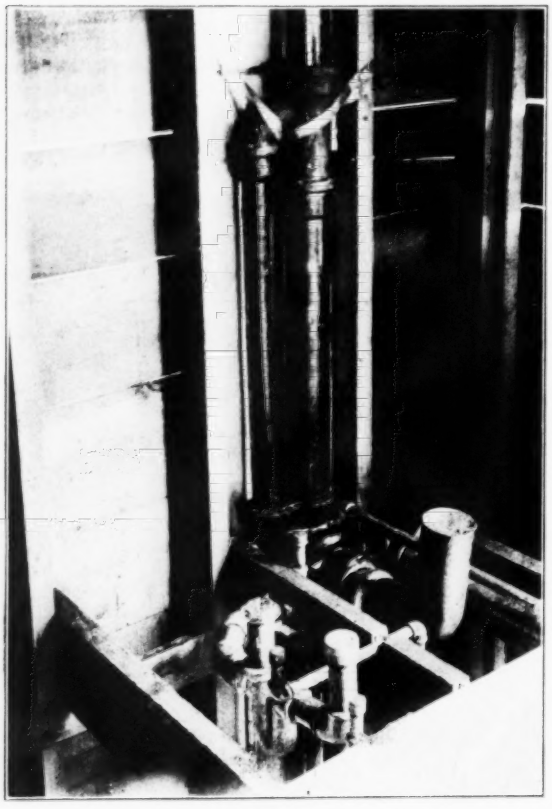


Fig. 2.

could be put in, the more work we would get to put in, as it would bring good plumbing within the reach of house-owners who would otherwise not be able to afford it. This theory I have proved to be correct. Another thing that helped me to arrive at this conclusion was that the boys in the shop were all brought up in the town and could not wipe joints, and as the work had increased to such an extent that I could not handle it alone, I had to devise a system without wiped joints or lose the jobs. You would be surprised at the fine class of work some of these boys can do under proper instruction.

About two years ago I took up a course of plumbing, heating and ventilating with one of the correspondence schools which I have found very helpful in my studies. I would advise every young plumber or steamfitter to do the same. I have also continued to add to my library, until I have at the present time about forty volumes on heating and plumbing, besides a pile of papers and cuttings from the trade journals, which are all filed under the various headings, and are invaluable. You will find it hard to study at first, but after a little while it will become a habit with you and a pleasure.

I want to tell you that the time for doing work by rule of thumb has passed, and the man who wishes to be at the head of his profession will have to study as hard as any doctor or lawyer to keep abreast of the times. A good set of drawing instruments are also a necessity.

Your studies will give you a confidence in yourself that you cannot obtain in any other way. It makes your mind bright and quick to grasp and cope with any and every situation that may arise.

A few months ago I asked a steamfitter if he ever read anything about his work. He laughed at me and ridiculed the idea. He said he knew as much as most fellows; the other day I heard he was hunting a job. I took the trouble to look up his late boss and ask him the reason. He answered me with one word, "incompetence." This little incident convinced me more than ever that the old rule-of-thumb man will soon be a thing entirely of the past. Let this soak in, boys!

(To be Continued.)

January 23, 24 and 25, 1912.—The 18th annual meeting of the American Society of Heating and Ventilating Engineers, at the Engineering Societies Bldg., 29 West 39th St., New York City. The officers of the society are: President, Reginald Pelham Bolton, New York City; first vice-president, Prof. John R. Allen, p. t. Constantinople, Turkey; second vice-president, A. B. Franklin, Boston; secretary, W. W. Macon, 29 West 39th St., New York City.

January 24 and 25, 1912.—The 20th annual convention of the Illinois Master Plumbers' Association, at Decatur, Ill. Headquarters will be established at the St. Nicholas Hotel. The officers of the association are: President, F. U. Patterson, Springfield, Ill.; vice-president, Wm. J. Hilliard, Elmhurst, Ill.; secretary, W. C. Haviland, Aurora, Ill.; treasurer, Thomas Cody, Peoria, Ill.

May 7, 8 and 9, 1912.—The seventh annual meeting of the American Society of Inspectors of Plumbing and Sanitary Engineers, in St. Louis, Mo. The officers of the society are: President, Martin Conroy, St. Paul, Minn.; first vice-president, John Hefferman, Houston, Tex.; second vice-president, Lawrence J. Lawler, Pittsburgh, Pa.; secretary and treasurer, Thos. J. Claffy, City Hall, Chicago.

May 14-17, 1912.—The sixth annual convention of the Master Boiler Makers' Association, at Pittsburgh, Pa. Headquarters will be established at the Fort Pitt Hotel.

June 25, 26 and 27, 1912.—The fourth annual meeting of the National District Heating Association, in Detroit, Mich. The officers of the association are: President, A. D. Spencer, Detroit, Mich.; first vice-president, Warren Partridge, Springfield, Ill.; second vice-president, R. D. de Wolf, Rochester, N. Y.; third vice-president, Cadwallder Evans, Jr., Pittsburgh, Pa.; secretary-treasurer, D. L. Gaskill, Greenville, O.

Miserly.

The man who was so mean that he sat in the back pew in church to save the interest on his cent while the contribution-box was coming around has at last found a rival.

This man, it is declared, took his supper a little later each night.

"Now why does he do that?" some one asked, in surprise who did not know him very well.

"Why, so that presently his supper will come after twelve o'clock, and then he'll call it his breakfast and save one meal!"

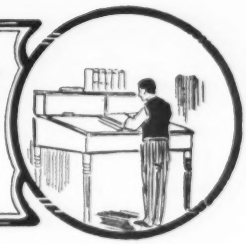
Mrs. King—Yes, my daughter Tessie married a plumber, and she has a nice home and is getting along nicely. Julie married a shoemaker and is very comfortably provided for. Alice married a butcher and is happily situated.

Mrs. Frazier—And your daughter Nicolette?

Mrs. King (sadly)—Alas! She married a foreign prince. I send her five dollars a week, and by taking in washing she manages to support the family.—Truth.

BUSINESS MANAGEMENT

NEW METHODS FOR OLD



A MASTER PLUMBER'S DUTY TOWARD THE APPRENTICE AND HIS TRAINING.*

By Eberhard J. Bauer, of Lancaster, Pa., Member of the Central Pennsylvania Association of Master Plumbers.

The apprentice, as a general rule, is a boy of about 16 or 18 years of age—just the time of life when careful training and a cool and willing hand to guide him are required.

The boy, when started in the shop, should be given instructions by the master plumber as to his duties; he should be given the proper introduction to the foreman and be made feel that he is welcome and that his attention to his duties is of vital interest to himself as well as to the master plumber. He should not be shoved from one mud-hole to another without a word of encouragement or instruction, but should be told the nature of the work and how to proceed with it.

First—an insignificant thing—but have you ever noticed how few men, to say nothing of boys, understand the use of a shovel and the care of the same? Just look it up and you will see how many shovels are strained at the handle or twisted from improper use.

He should be given instructions regarding the pipe-wrench and should be shown the difference between it and the monkey-wrench. Tell him that to work correctly the pipe-wrench must be adjusted so that the springs slip over the pipe or fitting just a little loosely and that the down-pressure is what tightens the grip. Tell him how to take care of and clean a wrench, how to keep the teeth in the jaws properly cleared of scale and that all oil and pipe-joint composition should be kept out of the teeth.

Take pains to show him how the dies in your stock work, explain the adjustment, what brings the dies to place and causes the different parts to act, and what parts to be the most careful of, especially the late improved stock and dies.

He should be shown the difference between a properly and an improperly cut thread, for instance, one too shallow or too deeply cut. He should be impressed with the fact that plumbing is not a mere matter of screwing pipe together, but that it should be run level, square, plumb, or with the proper grade, as the case may require. Should it be out of alignment, such as an offset or 45-deg. fitting, he should be shown the proper way to do it. In putting on a stop, care should be taken that he does not pull on the opposite square, but on the one which is being screwed on to the pipe.

He must be taught to lay out his runs of piping in his mind and to have them look neat when actually done, and parallel with his other work where possible. Instructions should be given him regarding his duties toward keeping his hands clean so that he does not mar the paint and paper, impressing him with the fact that doing tidy work is one of the greatest assets in making a good mechanic, for where there is tidiness, there is order, both of which require forethought and aid in mapping out the work, and these are very important essentials for a good mechanic.

Be kind to him—do not scoff at him, but tell him just how and what to do. He should be given an opportunity to read your magazines pertaining to plumbing work, and to study catalogs in order that he may familiarize himself with the fittings and the proper names of them. One of the most important things to do is to get the boy's interest aroused, for if he is not interested enough to want to know why or why not this or that is done, he will be a drag on himself as well as on you. Once that interest in his work is aroused you will find that he will not wander around so much, but will stay at home more in order to read and learn more of his trade, thereby benefiting himself and you.

He should also be given instructions regarding lead what it is and how it is gotten; how to take care of wiping solder; what zinc is, what tin is, how they are found and their value; the composition of solder, different grades, what is meant by plumbers' and tinners' solder and the difference in fineness and coarseness. Joint-wiping should be carefully explained to him and he should be induced to practice at home or at the shop. He should be given an opportunity to observe the master plumber or the journeyman for a half-hour or so as they are doing this work; it will be time well spent.

The apprentice should be trained to be economical, for by teaching him economy the master plumber is benefiting himself as well as giving the boy a good foundation for a successful business man. By having him be careful to see that all scraps are saved this habit will be acquired and quite a lot of valuable stock will have been saved by the time the end of the year arrives. Another important factor to be borne in mind is that the faster he learns, the sooner he can be put on work alone or with a helper, by which much profit is derived. He is made a better mechanic. By this, however, I do not mean that the shop shall be run by apprentices, as a great many are. He must be taught that speed is what is wanted after he is through with his trade and that his aim, after he knows how to do a thing, is to see how fast and how well he can do it. The master plumber should instil the apprentice with the importance of doing good work, so that he will never let "good enough" get the best of him. We are past that age now. We must get the best of our competitors in workmanship.

The master plumber, when he accepts a boy for apprenticeship, should remember that he is duty bound to give the boy an education to the best of his ability. For this small disregard we have to-day thousands of men going over the country who have only half learned their trade by not being properly instructed or who were not talented for the particular trade and were not told so by the master. They were simply left drag along, because through them they were making some money and when the time was up, were turned loose to drift, no good to themselves or any one else, and by this time they are too old to

* Reproduced by courtesy of "Plumbing and Heating Journal."

learn anything, but are a general botch. The master plumber, if he wants the boy to be a credit to himself and to him, must treat him as he would be treated.

After he has been with the master a couple years, he should be instructed in regard to making up an estimate on a job, how to lay the work out on paper and how to compute the different items. Of course, your business secrets need not be given away to him! It should be seen that he does the estimating and the work should be checked up—for an error may be found which the master plumber himself made, for he is susceptible to error even though he is master of the art. The apprentice should be taught how to compute the cost of articles by adding freight, drayage or boxing, etc.

This is only the beginning and part of the business education which is due the boy. If our plumbers had more business education we would have more of them in our master plumbers' association. We could maintain a higher standard of work, we could get better prices, and we would have gentlemen instead of a lot of incompetent workmen in business who are a detriment to themselves as well as the community.

If your work is slack do not lay off all your men, but get busy and try to keep them going by giving them two or three days each alternately until it brightens up, then you will have your well-trained men and their good will, and will have kept their homes bright and happy.

SCIENTIFIC MANAGEMENT AS APPLIED TO THE HEATING INDUSTRY.*

Chas. S. Kellum, M. E.

So much publicity has been given to the subject of Scientific Management during the past few months that many interested in the heating-contracting business are inquiring as to whether this science cannot be brought to bear in their business to attain some measure of the success it has produced in other lines of endeavor. Possibly the science of management cannot effect such a marvelous percentage of gain in this business as it has in others, but an understanding and application of its principles and a little co-operation between contractors as to standardizing the various elements affecting their work would be certain to produce results which, from a business standpoint, would be beneficial to all concerned.

There is a general tendency to regard scientific management as a thing too abstract, too theoretic to be grasped and applied by any one without a technical education. The contrary is quite the case—it is very simple when once understood—it is, in effect, the study and classification of little things, of details. Its basic principle is that there is a wrong and a right way to do a thing—it endeavors to find out the right way and to have every operation performed in that way. It analyzes every detail of an operation—it studies every movement—and by bringing the performance of the detail to perfection, it gradually standardizes the entire operation so that it will be performed in the least time and with the least expenditure of effort. It saves in the cost of operation. It permits of a larger recompense to the workman, and it raises the quality of the work. All this it has done in innumerable cases and all this it will do when properly applied.

We must not regard the science of management as a system or formula which can be applied successfully to the business as a whole, but rather as a method of standardizing those individual operations which as elements go to make up the entire business. Just as the smooth running of a machine depends upon the correct operation of its various parts, so does the economical and efficient running of an organization depend upon the elements which comprise it.

General Elements.

Now these elements which determine whether or not an organization is to be effective are naturally those things on which the organization rests. They are just the same for a manufacturing plant as for a contracting shop, for a big business as for a small, and may be classified as follows:

1. The man.
2. The work.
3. The conditions under which the man does the work.
4. The planning of the work the man has to do.
5. The man's reward for work done.
6. The records of the work done by the man.
7. The routine of planning, working and recording.

Man primarily is the caisson on which the structure of an organization rests, for without man no work could be done, except such as Dame Nature might perform unaided or unguided by man. A knowledge of man is therefore most important.

In making a study of the men and their work, it is well to get together a picked gang of men and keep them together as their work is watched from one job to another. This picked gang of men might mean the whole force in case the business was a small one, or it might mean only a few from a large number of men. In picking the gang it is well to remember the old "Birds of a feather" saying, for in order to experiment with the men successfully they must be in harmony with one another.

Savings Made by Standardizing Operation.

It is now common history how Frederick W. Taylor experimented with a gang of pig-iron handlers and how he so standardized the simple operations of lifting and carrying that he executed the same volume of work with about one-third the number of men it took to do the work formerly. The story of this reads like fiction. It seems incredible, and yet the records prove the results obtained.

Now while steam-fitting is a craft which calls for a man to do many different operations in the course of a day, there are many of these operations which can be so standardized that an immense saving of energy and time will result. We all know that John and his helper can cut more pipe than any other men in the shop in an equal space of time, but the trouble is we do not know why they can. The reason probably lies in the fact that John and his helper work in such synchronism that they perform their work with about one-half as many motions as the other men. Everywhere you see men working you can observe lost motion and effort uselessly expended. It is not so much that men "loaf" and "soldier," as it is that they apply themselves in the wrong way and get poor results. They do **work more** and not **more work.**

If the men in every line of work could be brought to standardize their operations to a minimum of lost motion, this world would be far happier and better for all, employer and employee, man, woman and child, than it is now, for waste brings want and want means unhappiness.

The amount of coal which passes unconsumed up the chimneys of the world has been estimated to mean a

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dead loss to the world of sixty million dollars annually, but this loss is insignificant when compared with the loss of production caused by workmen making unnecessary motions. Both of these losses are, however, preventable in a large degree, and each succeeding year will see these and other losses lighter and lighter, until in the Utopian future we will have an era of industrial thrift.

Now that the manufacturers of valves, pipe and fittings have standardized their product so that a ⅜-in. pipe thread fits into a ⅜-in. pipe-fitting the world over, why cannot the contractors who cut the pipe make the operations as standard as the thread itself?

Fairness to Employee Essential.

Before attempting to apply the principles of Scientific Management it is well to bear in mind that if a successful issue is to be brought about the following rules must be observed:

1. Give a square deal to the man.
2. Have ample preparation for each new departure.
3. Make no short cuts or ill-considered improvements.
4. Keep everlastingly at it.

In giving a square deal, the men in the experimental gang must be made to understand that the experiments tend to an increase in their productive labor and such increase will be materially rewarded.

Conditions Under Which Work is Performed.

Now that we have summarized those principles on which the Science of Management is built, let us see what conditions surround our men at their work and see if we cannot alter these conditions to better advantage for the study of our men and their work.

The greater portion of the work of the heating contrtctor is performed on the job, so we must give the work on the job our first attention.

Arrange the material on the job so that there will be a separate and distinct pile of fittings and pipe of each particular size, placed in such a way that they will be near the point where they are being most extensively used. For example, if the men are cutting coils on the third floor of a building, the pipe and fittings which are to be used on that floor should be delivered there and placed in easy access to the cutting-bench.

Too much stress cannot be placed on the importance of having materials at hand, for a high-price fitter should devote his energy to the work at hand and not to chasing up materials and tools. In jobs of any considerable size it is well to have one or more common laborers to act as tenders for the men actually performing the work. The duties of the laborers or tenders should consist of:

1. Arrangement of stock and tools on the job.
2. The transferring of the stock and tools to the workmen as needed.
3. The cleaning up after the workmen.
4. The heavy carting, such as moving radiators, coils, boiler sections, etc.
5. Placing coil and radiator-brackets, floor-flanges, ceiling-plates, etc.
6. The fastening of pipe-hangers either during or at the completion of the work.

In arranging the stock and tools it is often handy to have such parts as can be so handled put into boxes of such size that they can be carried about. Boxes similar to those used in factories and called shop boxes would answer such a purpose.

In transferring stock on a large job a small truck is desirable, for a number of boxes and even pipe can be transferred easily on the truck. Radiator-trucks are now becoming generally recognized as an efficient way of handling cast-iron radiators, inasmuch as the labor of handling and danger of marring fine floors and woodwork is reduced to a minimum.

Cleaning up is a very important duty, for fitters working with short ends underfoot and on the bench are at a disadvantage. Short ends as soon as collected should be put into boxes and returned to shop, inasmuch as they are always valuable for nipples and make-up lengths.

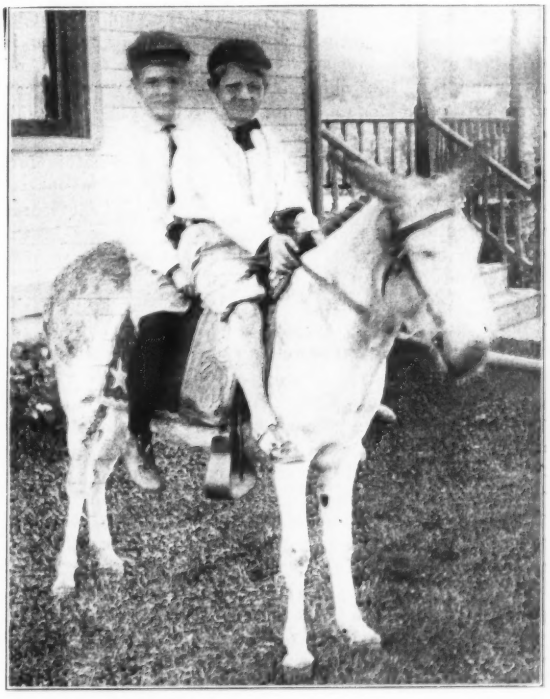
Much time and labor can be saved in studying the types and methods of fastening various pipe-hangers, for some one hanger usually has better advantages on one job than another.

The foreman or gang-boss should pay considerable attention to the work of laborers, for if their duties are consistently performed much of the time otherwise wasted by skilled workmen will be saved.

(To be continued.)

A LETTER FROM A LITTLE PLUMBER.

Editor "Domestic Engineering": I am going to be a plumber like my papa. But I am going to be an expert before I start my trade. This vacation I am going with



A Young Plumber and His Brother.

my papa, and he will tell me the difference between a tee and an elbow.

I am going to learn how to wipe joints, to solder, and to use the stocks and dies. He will show me how to find leaks, to test jobs, and many other things. But when I'm a plumber I wish to be a master plumber and boss the men like my papa does, and read at night.

I am learning to typewrite on my papa's typewriter. I am going to write my experience when I am a man. I will enclose my picture. The first one on the donkey is me, the second is my brother, who is going to be an electrician. Yours truly,

Bellevue, O. Bertie Dawson.

More Advantages of a Vacuum System

By Ust. A. Dub

In the article on vacuum systems which was published in the issue of November 4th, there was one point which was purposely omitted. One reason for the omission was want of space, the other was hope of bringing up a discussion. However, as the article failed to bring forth the desired results, I will mention the omission at this time.

Before, we considered only the actual heat units to be gained by the use of the vacuum system, but we will now see that there is another advantage which, in reality, is greater than the saving of the few stray heat-units which may be captured at the time of shutting down the fire.

Let us suppose for example at a certain time, after the system has been working for several hours, that instead of drawing the fire, we only close down the dampers and cause the fire to burn more slowly. In this case, since we are still burning coal we must still be generating steam. And since the temperature of the radiators is about that of the room they will still be condensing steam. However, the demand is greater than the supply, that is, more heat is being given out by the radiators than is furnished by the boiler so a vacuum begins to form. And (assuming that the piping is perfectly tight) no air can come into the system so it must continue to be filled with steam. Then what happens?

As no more heat can be given off than what is furnished, the radiation begins at once to draw on our reserve fund which is the 37,647 B. t. u., the heat stored in the liquid. Since there are 270 lb. of water in the boiler for every 270 B. t. u. which is thus removed the temperature of the water will be lowered one degree. Hence in order to keep the water boiling, the vacuum must raise to a corresponding degree. Also the temperature of the radiation is reduced and each square foot of radiation gives off so much less heat.

This continues until a point is reached where the amount of heat given off by the radiation is only equal to the amount furnished by the boiler, under which condition the radiators are all heated throughout, although at a much lower temperature. In spite of the fact that no more heat-units are delivered to the room than would be the case under the old system it has the advantage that each radiator is getting its share, and in the case where the radiators are in separate rooms, each room will be supplied equally. In other words each room will get its share of whatever small amount of heat is being furnished.

Let us suppose for example we allow only enough coal to burn to furnish heat to three-fourths of the radiation. What will happen? Since the air cannot pass back into the system the entire system will be filled with steam, but since there is only three-fourths enough heat supplied to keep the radiation at a temperature of 212 deg., the only thing which can possibly take place is for the temperature of the radiation to drop to a point where one square foot will give off one ¾ of the original amount; ¾ of 250 or 187½ B. t. u. per sq. ft. This point will be found one-quarter of the way between 212 deg. and 70 deg. or 177 deg. F.

By reference to Peabody's steam table we will see that to boil water at this temperature requires a pressure of 6.7 lb. per sq. in. absolute, which is 8 lb. below atmospheric pressure corresponding to a vacuum of approximately 16 in. of mercury. Thus we see that in order to keep the entire amount of radiation filled with steam, when only three-fourths of the coal needed is being burnt to keep the radiation filled with steam at atmospheric pressure, we must obtain a vacuum of 16 in. of mercury.

Now let us see what would happen in an ordinary one-pipe steam job under the same conditions. First, enough coal is burned to supply steam to the entire amount of radiation, then after a time the dampers are shut down to a point where only three-fourths of the amount of coal is burned that is necessary to keep the entire amount of radiation filled with steam. In other words, only three-fourths of the amount of steam is furnished which the radiation will condense, so naturally air is drawn in through the air-valves to fill that part of the radiation which is not filled with steam and since the boiler is furnishing only three-fourths as much steam as the radiation will condense, the remaining one-fourth of the radiation must be filled with air and become cold. As to where in the building this one-fourth would be, it is difficult to say. It might be the one quarter of each radiator which is on the end next to the air-valve or it might be the one-fourth which is on the extreme end of the steam-main. That is if there were 12 radiators of the same size on one main, the last three would be cold while all the others were entirely filled with steam at 212 deg. F.

Thus we see that in this case although only three-fourths of the radiation is heated, it is at a so much higher temperature than in the case of the vacuum system that exactly the same amount of heat is delivered to the building in each case. However, in the case of the vacuum system the distribution of heat is uniform throughout the system while in the latter case it is apt to be very unequally distributed. Since the total amount of heat delivered is exactly the same in each case, we can see that the advantage gained by the vacuum system depends somewhat on the character of the building. In the case of a large factory-building or auditorium where all the radiators are in one large room, the distribution of heat among the radiators is not an important factor and on such a building a vacuum system is of little or no use.

However, in the case of a building with a large number of rooms, with only one radiator in a room, the distribution is of very vital importance and anything that will assist in making it better is worth consideration, be it a vacuum system or any other method.

One may say that it is only in mild weather that such a condition exists, but note that the greater part of the heating season is mild weather, and, if in order to heat certain radiators in mild weather, it is necessary to furnish enough steam to heat the entire amount of radiation to a temperature of 212 deg. then we are burning as much coal in mild weather as is needed in cold weather.

On the other hand, if the outside temperature is such that only one quarter that amount is needed, and we are able to distribute that equally among the several rooms of the building, no room will be overheated and yet each room will be comfortable. This cannot help but be a saving in fuel.

We have shown above the number of inches of vacuum necessary in order to distribute any certain amount of heat through ⅛ more radiation to be 16 in., we will see from the table given below that a less degree of vacuum gives a correspondingly smaller advantage.

This table is worked out on the following assumption.

1. That for every pound of coal burned there are generated 14,000 B. t. u. and that 50 per cent of this amount is absorbed by the boiler. Thus the system is furnished with 7,000 B. t. u. for every pound of coal burned.

2. That every sq.ft. of radiation gives off 1.75 B. t. u. per degree difference in temperature between steam and surrounding air.

3. Room is kept at 70 deg. F.

4. Heat radiated from boiler and pipes is neglected.

Amount of coal burned.	B. t. u furnished to system.	In. of vacuum and pounds pres.	Sq. ft. of radiation required to condense steam.	Temperature of radiation.	Total heat delivered to bldg.
10 lbs.	70,000	24" Vac.	597.	137	70,000
10 lbs.	70,000	20" Vac.	444.4	160	70,000
10 lbs.	70,000	16" Vac.	380.9	175	70,000
10 lbs.	70,000	14" Vac.	342.	187	70,000
10 lbs.	70,000	8" Vac.	314.9	197	70,000
10 lbs.	70,000	2" Vac.	296.2	205	70,000
		0 pres.	281.5	212	70,000
10 lbs.	70,000	2 lbs. pres.	268.4	219	70,000
		5 lbs. pres.	205.4	227	

It will be noticed from the above table that the burning of 10 lb. of coal per hour will serve 281.5 sq. ft. of radiation with steam at atmospheric pressure keeping it at a temperature of 212 deg. and delivering to the rooms 70,000 B. t. u. per hour. While with 20 in. of vacuum the same amount of coal will serve 444.4 sq. ft. of radiation keeping it at a temperature of 160 deg. and delivering to the building exactly the same amount of heat as in the previous case. The only advantage being, that it is distributed over a larger territory. However, the reader will notice from the table the degree of vacuum necessary to affect the distribution of heat to any appreciable degree; then think of the difficulty of obtaining this degree of vacuum and ask yourself the question: "Does it pay?"

There is an easier and more dependable method of obtaining this equal distribution of heat which will be discussed in the next article.

ALL PLUMBERS IN READING, PA., TO PASS AN EXAMINATION.

Reading, Pa., will have a permanent board to examine master and journeymen plumbers, starting with the first of the new year. Mayor Stratton will send the names of the persons who will compose it to Select Council at its next meeting.

Up to this time master plumbers have had to furnish a bond of $1,000 in order to register and receive a certificate of license from the Department of Health. Unles they pursued this course, they could not do business in Reading. There was no requirement of journeymen plumbers.

Under an amendment to the act of the Assembly, regulating health matters, the method was changed from entering into a bond, which had to be approved by the Council, to holding an examination, not only for the plumbers in business for themselves, but for their mechanics. Plumbing inspection has been made an important function of local health departments in the State, and every opportunity for improvement of these rules, thus more strongly fortifying it in its powers, has been seized.

One of the most recent amendments to the act was the one providing for an Examining Board, and the Reading Health Board when it revised its code several months ago, included the best that State laws offered in the matter of protecting the health of the people. Among the adoptions was the Examining Board.

Starting with Jan. 1, 1912, instead of the Health Board licensing a master plumber after the necessary endorsements were submitted, a school, as it were, will be held to ascertain the fitness of both master plumbers and their skilled employees to follow their business and vocation, respectively, and to learn of their knowledge of the sanitary laws of the Commonwealth. The examiners, as provided by State legislation, will consist of the Plumbing Inspector, who is John D. Corbit; the Health Commissioner, who is Roland Laing, the incumbent for 30 consecutive years, and two competent plumbers of the city, whom the Mayor is authorized to name. The latter pair can be both master plumbers, both journeymen, or one of each. Mayor Stratton has selected the two and will ask the Select Council, at its first regular session to confirm them. His communication likely will explain the change in method.

The two plumbers will receive $5 a day. The city officials on the Board do not receive extra compensation. It is estimated that 100 men must take the examination and that, for a beginning, all sessions will last about a week. After next year the work can be done in less time. The new plan will not be an additional expense to the city, as the paid examiners will be provided for out of the fee fund. Masters will be charged $5 to register and journeymen 50 cents.

SOME TIPS FOR THE TRADE.

Hoopeston, Ill.—Arnold & Alkire have bought out Alkire & Flaff and want catalogs on plumbing supplies and heating appliances.

Pittsburgh, Kansas.—Kirkwood & Hammett have resumed in the plumbing business after suffering loss by fire.

Elgin, Ore.—J. W. Leighton has bought out the Elgin Hdw. Co., and will add a plumbing department.

Okmulgee, Okla.—T. C. Dixon has engaged in the plumbing business and has bought out the Central Hdw. store. Catalogs of plumbing goods are desired.

Lemont, Ill.—Catalogs of plumbers' supplies are wanted by Axel Anderson, who has started in the plumbing business. He will also do gas-fitting.

Glens Falls, N. Y.—The Robinson Hardware Co. will do a plumbing and heating business.

Sacramento, Cal.—The Capital Hdw. Co., has started business, with $75,000 capital stock. Catalogs and quotations on pipe and fittings and mill supplies are desired.

Gary, Ind.—Carl A. Heuttner has formed the Peoples Hdw. Co., and will do plumbing and heating.

Syracuse, N. Y.—J. F. Kincaid has resumed business after a fire. A plumbing business is the main feature.

Bonner Springs, Kans.—G. A. Perkins who has started in the hardware business will also do plumbing.

Rising City, Neb.—C. L. Humphrey has retired from the firm of Humphrey & Munns, the latter continuing business. A plumbing department is conducted.

Farmington, Iowa.—Catalogs of plumbing and heating goods are wanted by the Kelly Hardware Co.

Larned, Kans.—A plumbing business is being conducted by the Farmers Mercantile Co., which recently started in business.

Deming, N. M.—J. A. Mahoney, hardware and furniture merchant is erecting a new building and will soon open a plumbing establishment.

Wakeeney, Kan.—Catalogs of plumbing supplies are desired by David Kraus who has bought the plumbing business of George Myers.

Martin, N. D.—Frank White & Son are occupying a new store and will continue their plumbing business on a larger scale.

Mt. Vernon, Wash.—The Mt. Vernon Hardware Co. would like to receive catalogs and price-lists on plumbers' supplies.

York, Neb.—The Louis W. Mittendorf Co. has bought out Wright & Mower and need catalogs on plumbing supplies.

Marion, Kan.—Pollitt & Klienhammer have just opened a plumbing and heating business.

Browning, Mo.—Calhoun & Moore have bought out the business of John Gable and will take charge January 1.

Kamiah, Ida.—Business has been resumed by J. F. Pomeroy, who suffered a loss by fire recently. A plumbing department will be a feature of the new establishment.

Belmond, Ia.—Johnson & Holtzbauer have succeeded to the plumbing and heating business of C. A. Johnson & Co., and they would like to receive catalogs covering these lines.

Brooklyn, N. Y.—The Kings County Plumbing Co. has been incorporated with a capital of $1,000. The incorporators are Alexander Garlick, Nathan Wexler, Aaron Potruch and John Cleary, all of Brooklyn.

SCHOOLROOM SANITATION.

By E. W. Whitney, M. D., Medical Inspector Salt Lake City Schools.

To gain the greatest efficiency of teachers and pupils within a given period, certain physical conditions must obtain in the school room. The ennui and mental torpor of high temperature associated with impure air, is as great as that of an unreasonably low thermometer, if not more so. The physical depression of cold predisposes to infection and high temperatures also establish vulnerability. First, there must be pure air. Ventilation must be adequate to carry off easily, used and contaminated air. The exit-flue at the floor must be large and leading into a shaft which connects with a tower in which are devices for heating, hot pipe by preference, which will lighten the column of air and allow the gravity system full play. Heat is best of the indirect type, allowing pure air in ample quantity to pass over generous coils of steam pipes. The gravity system is here, too, efficient. A thermostat with an automatic control of the ingress of hot air is indispensable.

Regulation by teachers or pupils is an added mental tax and in practical results most unsatisfactory. Coils for direct radiation or direct-indirect may be placed on one side of the room, which should be all windows, and which requires such an excess of heat compared with the other walls. Opening the windows two inches at the bottom lets in air which striking the upward current from the radiators ascends and commingles with it, without jeopardizing in any way the heating system. In planning a plant it should be very much larger than the usually computed amount of radiation, which in my experience fails to rise to the demand of emergencies. It should ordinarily be able to do its work without being pushed at all. We have had some excellent results with the fan system also. On warm days when the atmospheric tension within and without the room is identical, electric fans are necessary.

The eyes must be supplied with a tempered light in sufficient quantity, which should pervade every part of the room. There should not be north rooms nor basement rooms. Unilateral lighting, one entire side of the room being windows, is highly satisfactory. They should extend from the ceiling to within 3½ ft. of the floor. This enables direct sunlight to penetrate to every corner of a properly constructed school room. The further indispensable function of sunlight equally important with that of illumination, is gained—namely, the germicidal action of the sun's rays. To sterilize a school room in any other way is difficult and most expensive. This is nature's way and should be wisely and universally used.

With the clear atmosphere of the intermountain region, shades are in constant demand, whereas out of school-hours all possible sunshine should be admitted for its antiseptic action, yet during the session it must be lessened and moderated. Translucent, not opaque, material of a cream color with a possible tinge of green, is most acceptable. A late shade devised so as to lower at the top or roll up at the bottom meets the required indications.

Green is most acceptable to the nervous system through the eye and should dominate in a school room. Dark green blackboards around three sides of the room and high enough to fill the angle of vision should be constructed. Above the boards and the ceiling, white is desirable as it helps to light up the room on a dark day. Neither desks, walls nor anything in a school room should show a gloss or sheen; the dull finish should be everywhere.

Independently adjustable seats and desks are demanded. The big backward boy and the bright little boy cannot occupy seats of the same size without jeopardy to the growing, developing skeleton as well as the eyes. Seats and desks must fit the child.

The method usually in vogue in the cleaning of rooms is barbaric, violating every precept of sanitation. The stirring up of clouds of dust and precipitating it upon the walls and anything that will harbor it, is a condition only for condemnation. Hardwood floors have replaced softwood floors, which roughen and defy the broom or brush. Moistened or oiled sawdust or composition has its field, but janitors find an easier way often, notwithstanding rules and regulations. Up to date there is only one ideal system and that is the vacuum.

By reversing the air during school hours, "dead" air-spaces could be inundated with fresh air. These "dead" air-spaces are found in school rooms. We have the Gulf-stream in the Atlantic and in a room the incoming hot air has its favorite course, with eddies of impure air here and there.

The toilets should be outside of the main building and connected by an arch, so as to eliminate absolutely the air which is usually contaminated, notwithstanding the efforts to the contrary. Glass should be utilized as much as possible. Marble, cement, slate and any absorbing material is contraindicated. Urinary salts will collect in the troughs and some material which will stand a solution of, say, muriatic acid, is desirable. This acid readily dissolves them.

Toilets for the kindergarten pupils should be adjacent to their rooms and those for the lowest grades should be by themselves.

Drinking-fountains should not have any manner of a cup or goblet form, but be so constructed that all water is uncontaminated by the pupil who has just drunk. These fountains should at all times show a column of water at least 1½ in. high. With the varying pressure in most mains, practically the height of the jet varies constantly from a mere oozing up to a column of several inches. It is therefore advisable to have a tank in the attic with which the drinking-fountains are connected, insuring a uniform pressure. Inasmuch as it is impossible to prevent children from putting their mouths over the tap or faucet in a washbowl, it should be so curved towards the side of the bowl as to outwit the most ingenious and persevering young American. Better, still, have the water well through an aperture at the side. All plumbing should be open.

Swimming-pools and baths are desirable, especially in the poorer districts. The plumbing should be the best in quality and installation.

With an up-to-date structure (and the Whittier School of this city has many claims to that honor) the per capita results must be greater and higher than in another institution with pupils and teachers of the same standard, but handicapped by an inferior school-room environment.

The added expense of superior and rational equipment is therefore not real, although possibly appearing so to the casual observer.

Aurora, Ill.—Several residents in districts where sewers have been installed have endeavored to make house connections for themselves, without calling on the plumbing fraternity, but they have been notified by Plumbing Inspector Mullen that the law requires a licensed plumber for such work, and that they will be liable to arrest if they disregard his warning.

HEATING-PLANT INSPECTION AND BOILER-RATINGS.

Editor "Domestic Engineering":—I have been reading with considerable interest the discussion in your valuable journal regarding boiler-ratings etc., and it seems to me that your correspondents, B. O. Iler and Drury Lane, if, instead of shooting their little arrows from ambush, they would come out into the open, they would put more force into their arguments. In giving my experience I will avoid technical terms for the reason that the average heating contractor is not familiar with them. It might be well to state that my experience has been of a practical nature, examining in the last five years over 2,000 heating installations.

You will always find this to be a fact, that if for any reason the heating apparatus is not giving satisfaction that the boiler is always blamed, notwithstanding that I have yet to make a test where, if the faulty conditions beyond the boiler were corrected, the boiler would develop a rating equal to the tax put on it, providing that this tax was not greater than 20 per cent more than the catalog-rating. The basis upon which most cast-iron boilers are rated are: 2-lb. pressure at the boiler and 70-deg. air-temperature surrounding the radiators in a steam job, in a hot-water job 180 deg. at the boiler and 70 deg air-temperature surrounding the radiators.

A heating plant may be divided into four parts:

First: The Chimney.
Second: The Boiler.
Third: The Piping, etc.
Fourth: The Radiation.

The chimney must be of ample size to permit a sufficient amount of air to be drawn through the bed of coals in the fire-pot in order to create perfect combustion of the coal gases. If the chimney is too large or oblong in shape the result would be to cause conflicting air-currents thereby causing a short circuit within the chimney and cooling the gases as they ascend. The reader will understand that at least 25 per cent of the heat-energy from the coal is necessary to form a column of air of higher temperature in order to create a sufficient differential in temperature. This differential will force the desired amount of air through the bed of coals in the fire-pot and create perfect combustion provided the house-owner properly controls the dampers and keeps the boiler-flues clean and the ash-pit free from ashes and clinkers. If this volume of air is insufficient only one-third of the heat-value of the coal is obtained for heating purposes.

The chimney should be of correct height above the highest point of the building in order to prevent down drafts, but aside from this probably the most important factor in chimney-construction is a tight chimney, and the hardest to find. It is remarkable the amount of service that a straight, round, tight chimney will contribute to a perfect heating plant.

It is necessary that a human system should have a sufficient amount of air, for without air there would be no life. The same comparison could be made to a boiler without a good chimney to assist in delivering the proper amount of air to be absorbed by the fuel gases, for without that it would be impossible to obtain complete combustion, or to induce circulation through the entire system so that the radiators could perform their function. A boiler may be defective, but with a good chimney, the boiler has a chance, but what show would a man have with a pair of lungs shot full of holes, squeezed out of shape, so that the air only hits the high spots and then to close off the bronchial tubes with asthma.

It is generally understood that in order to burn gas in a gas-burner that the proper mixture of air and gas must be maintained. If an insufficient or excessive amount of air is supplied to the gas, the heat-energy of the burner may be reduced 50 per cent without reducing the consumption of gas. If this burner be placed in a house-heating boiler it would naturally follow that the working capacity of the boiler would be reduced to the same extent.

Round water-boilers of 2,000 feet capacity of the one section type are being operated very satisfactorily on an 8 in. x 8 in. air-tight flue, 50 feet high, and I know of 600-foot capacity water-boilers that are not giving satisfaction on 12-in. x 12-in. straight tile lined flues. A leaky flue or a flue larger in area than is required for a given-sized boiler reduces the potential energy of the boiler. Every boiler-flue should be tested and made air-tight and I believe that conditions of this kind could be made possible in all cities that have a building ordinance by properly presenting the matter to the attention of the fire underwriters.

Most contractors install larger boilers and larger piping than is necessary to convey the steam to the radiator and occasionally install larger radiators than necessary to heat the rooms; this, however, is more common in steam-heating than in water-heating.

Another source of annoyance, to every one concerned, is the house owner who abuses the draft that a chimney could furnish, by choking the boiler to such an extent that he smothers the gases, then he opens the butterfly door in the ash-pit in order to create draft, thus he distills a greater amount of gases without adding sufficient air for combustion, and the result is that the gases pass to the chimney through the restricted opening unburned and thereby lowering the efficiency of the boiler.

The average heating contractor in selecting a boiler for a given building reviews the catalog rating of the various boilers and selects the boiler of a certain rated capacity which in his opinion will be necessary for the amount of tax put on it, giving absolutely no consideration as to the shape of the boiler or to the size, height or condition of the flue.

It seems to me that in this controversy the reader should pay more attention to the cartoon which accompanied B. O. Iler's article. The cartoon, in my opinion, has worked an injustice to every one connected with the heating industry from the man, who digs the core-sand and iron-ore, to the man, who pays for the finished product, and that if some one would appeal to the fair play of the Editor of "Domestic Engineering," he would publish a cartoon that would show the abuses which in almost every case extend beyond the boiler.

Chicago. L. W. Eggleston.

MODERN BOILER-RATING METHODS.

Editor "Domestic Engineering":—In B. O. Iler's article on "The Rabbit-Like Boiler-Question," he admits he was "funning," and I think the trade in general, he seems so solicitous of, will admit that this old chap is somewhat of a joker.

I say "old chap" because he certainly must be of the old school of "practical" men you have often heard of that lived in the old days when tubular power boilers were rated on the total amount of heating surface (15 sq. ft. = 1 h. p.) regardless of the number of pounds of water these boilers would evaporate under working conditions. If this old method of rating boilers was correct, why did the A. S. of M. E. adopt the evaporative test as being the correct method of rating power boilers?

In rating heating-boilers he goes on the theory that all these boilers are constructed practically alike (as were the tubular boilers) when he averages the number of B. t. u. transmitted by each square foot of heating surface at 3,000. From a number of experiments made by different engineers it has been demonstrated that the number of B. t. u. transmitted per square ft. of heating-surface varies from 9,000 to 0, depending on the position of same, the rapidity of the circulation of the water over these surfaces, the temperature-differences between the water and the fire or gases, and the rate of travel of the gases over the heating surfaces. I ask how is it possible for any living man to know all of these conditions even after a most careful examination of a boiler, and, not knowing them, how can he arrive at the number of B. t. u. each square foot of heating surface will transmit, and if he does not know this, it is an utter impossibility for him to rate the boiler from a given amount of heating and grate-surface.

Speaking of grate-surface, how does he arrive at the rate of 3½ lb. of coal per sq. ft. of grate-surface per hour as the average rate, and at 6 lb. as the maximum rate? How many "practical" men know under what rate of combustion a given make boiler will show the most economical results? We will assume, for the sake of an argument, that his maximum rate of combustion is correct, what serious objection is there to running a boiler on an 8 or 9-lb. rate for 6 to 10 days of zero weather, for, say on an 8-hour firing-period, with a probable small loss of efficiency, when the average rate during the heating season is probably one-fourth of this? Why rate a boiler at its highest efficiency for zero weather and at a lower efficiency for the balance of the season? Is this real economy?

In rating heating-boilers he seems to have omitted two of the most important items to be considered ,and those are fuel capacity and the time factor. It is very essential that a house-heating boiler especially shall not require firing oftener than once in 8 hours in zero weather, which will mean once in 12 hours in ordinary winter weather, and the fuel capacity must be such that the boiler will carry its rating under these firing periods, with sufficient burning fuel left at the end of these periods to properly ignite the fresh charge. If the time factor is not considered, it is possible to run most boilers on the market today so that they will carry double the rating if run under an 8-lb. rate of combustion for 6 hours as they would if run under a 4-lb. rate for 12 hours, on the same charge of fuel; so you can see how important the time factor as well as fuel capacity is, and why some boilers seem to be rated higher than others. They will carry their rating, but for shorter firing-periods, with possibly the same efficiency if constructed to run under a higher rate of combustion.

I think, to be fair to the manufacturers of heating boilers, you will find most boilers are rated to be the most efficient under the average conditions of installation, draft, attention, etc., and this to the practical man seems the most rational way. If these conditions were all alike, then all boilers of like construction could all be proportioned alike and proportionally rated, with practically the same efficiency.

I am willing to admit that the draft is the most important factor to consider as to the efficiency of a boiler, but if a boiler should be constructed as to the proportioning of heating-surfaces, to operate under perfect draft-conditions, it would be a miserable failure if operated under an indifferent draft, because there would be insufficient draft for good combustion on account of the frictional resistance of the flues. How many practical men have fallen down on a boiler with an excess of flue-surface on account of insufficient draft. Isn't it much better to install a boiler with possibly a little lower efficiency and have it work satisfactorily, than be compelled to remove one that might be a little more efficient on a better draft, or, should the draft prove stronger than expected, to install a good damper for the purpose of checking an excessive draft. Can we heating contractors afford to take these chances? I say not until the owners furnish us with perfect flues, and from experience we know they do not. Hoy many owners and architects will admit the trouble is with the flue? Not many.

If it were possible to construct a boiler to operate on all kinds of flues up to the maximum efficiency of the draft of the flue, 90 per cent of the boiler troubles of the heating contractor would be eliminated. This would place the responsibility of economy on the owner who furnishes the flue (where it should be placed), it then being up to the contractor to garantee the capaciy only; but until such a boiler is constructed, it is up to the heating contractor to exercise the best judgment possible to avoid trouble when installing a boiler.

I cannot agree with Mr. Iler in his statement of "Boiler Essentials" as to large water-ways. Why large water-ways and a sluggish circulation? Small water-ways mean a more rapid circulation, which means more heat transmission per sq. ft. of heating-surface.

How does he arrive at the conclusions of efficiencies by the ratio of heating-surface to grate. He gives a 50-per cent efficiency for sectional boilers with a ratio of 12 sq. ft. of heating-surface to 1 sq. ft. of grate, and efficiencies for round boilers of 40 to 60 per cent with varying ratios of heating-surface to grate. How can he assure us he is correct as to these efficiencies?

I contend the only way you can arrive at the correct rating and efficiency of a heating-boiler is to make an evaporative test (say from and at 212 deg.) for each size boiler, this test to be made under average conditions of draft, etc., with certain stated firing-periods, the efficiency to be based on the average number of B. t. u. per lb. of coal to be used. This is the only practical or scientific method of testing boilers, and the manufacturers should garantee them accordingly. Then the heating contractor knows exactly what he is getting for his money, and knowing what conditions under which the boiler will be installed, he can have no excuse for failure if he understands his business. If he is not competent to install a boiler knowin these conditions, he should not be in this "game" at all. Why should we bother about what the proportion

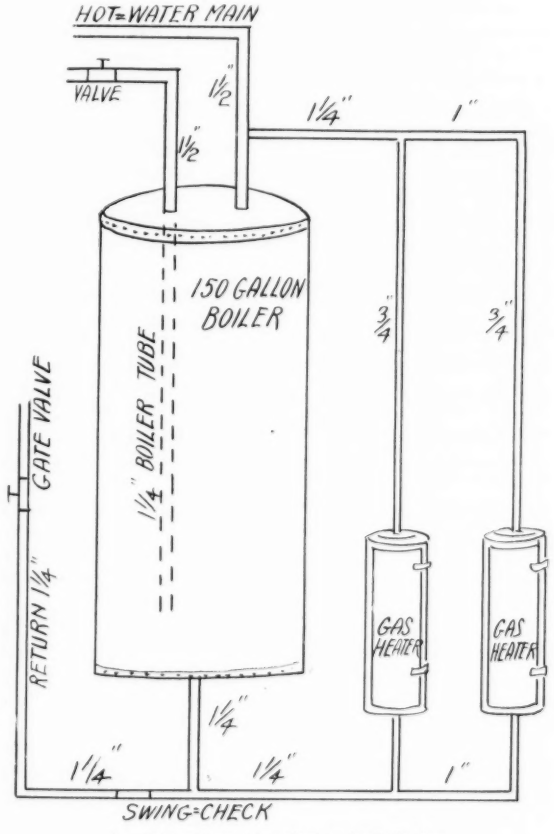
of heating-surface to grate is, nor the amounts of same, if the boiler will transmit a given number of B. t. u. from the fuel to the water in a given time, with a certain efficiency (B. t. u. per lb. of coal) under average conditions of draft, etc.

Austin. Drury Lane.

TWO SMALL GAS-HEATERS HEAT WATER FOR AN ENTIRE HOTEL.

Editor "Domestic Engineering":—The accompanying sketch shows a heating installation, in which two gas-heaters heat water for 44 lavatories, 6 bath-tubs, 2 sinks and 4 slop-sinks. It takes only one hour to heat the boiler, which has a capacity of 150 gal., and after the water in the boiler is heated, one heater supplies enough hot water for the rest of the day.

We installed this plant in the Gray Hotel in this city, and it has proven a success in every way. The operation



An Interesting Hot-Water Installation.

of this plant costs less than half of that of the ordinary plant heating water for the same number of fixtures.

It occurred to us that readers of your "Questions and Answers" department might be interested in seeing this sketch, that's why we submit it to you for publication.

Los Angeles, Cal. Howe Bros.

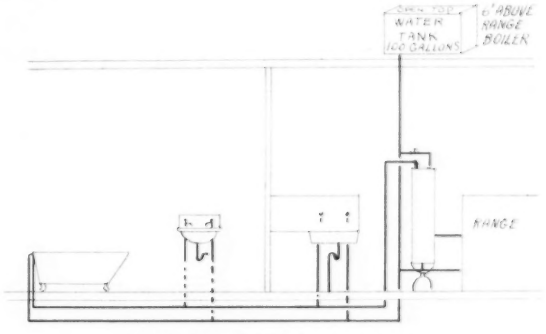
On the Ocean, Too.

First Sailor—There ain't a sign of a breeze anywhere, and we are right in the course of the trade winds, too.

Second Sailor—My boy! I wonder if the trade winds have stopped on account of hard times.

A DEFECTIVE HOT-WATER INSTALLATION.

Editor "Domestic Engineering":—I would be glad to have some of the many readers of your valuable journal tell me why water cannot be drawn from the hot-water



A Defective Hot-Water Installation.

cocks at the different fixtures, and how the defect can best be remedied. The sketch shown herewith will give you an idea of the piping of the little plant.

Topeka, Kans. L. B. M.

THE STORING OF DIE-STOCKS.

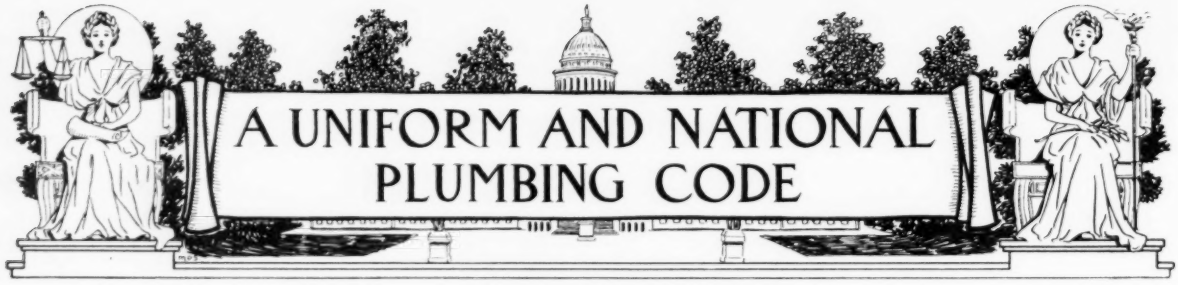
Editor "Domestic Engineering":—I notice your reproduction of the "short pipe" rack in your last issue. It looks good to me. A device that originated in our shop may also interest your readers. Recently we needed a better arrangement in our tool-room for the holding of our die-stocks. I purchased two lengths of special pipe-coil hangers for 1¼-in. pipe, each of them being 8 ft. long; these I screwed on a couple of 2 x 4's and nailed the bottoms to the floor, and the tops to a side-wall with a slant of about 2 ft. I find this makes one of the most convenient, cheapest, strongest and best racks for the purpose that we have ever come across. I am anxiously awaiting your much heralded "Humdinger" and I am sure it will be bigger and better than ever, and a credit to your ability and enterprise.

Minneapolis, Minn. W. W. Hughes.

A DUAL BIRTHDAY-CELEBRATION.

Henry K. Paine and his brother Isaac, who have been in the plumbing, heating and hardware business in Brookline, Mass., for more than 30 years, had a dual birthday celebration a fortnight ago. Their birthdays fell on the same day, December 12, although Henry is 75 and Isaac five years his junior. No formal celebration had been arranged but friends and business associates got together and arranged a post-card shower and as a result the brothers were literally swamped with cards. In addition they received numerous floral tributes and many more substantial remembrances. Both men are veterans of the Civil war and are natives of Eastham, Mass. At the close of the war Henry settled in New Bedford, but 36 years ago opened a plumbing establishment in Brookline. At about the same time Isaac became connected with the stove and furnace business in Newton, Mass., and six years later they joined forces in Brookline.

Fond du Lac, Wis.—John F. Ahern, of the plumbing and heating concern of the Ahern-McCoy Co., has just been elected president of the Water Commission of this city. The plant of the water company was taken over by this city Dec. 1st, at the valuation fixed by the state rate commission of $345,000, so this is the first water commission the city has had, and it will have considerable work to do, as a good many improvements are contemplated.



By Henry D. McCormack, C. E.

XXI.

Refrigerator and Safe Wastes.

Safe wastes are fast becoming things of the past. Before the advent of open plumbing, lead safes were installed, in all good work, under all the fixtures, and waste-pipes from these safes discharged in some receptacle at a lower level, so that in case of a leak the lead pan forming the safe would collect the water and the waste-pipes carry it away. So scarce is this branch of plumbing work becoming, however, that it is doubtful if ten years hence beginners at the business will ever see one installed. In the place of the old lead pan under fixtures, beautiful, impervious, and sanitary tile has been substituted, and it is a tribute to present-day workmen and methods that the waste pipe is dispensed with entirely. If a leak develops now, it is self-evident to any one who steps into the room, and is attended to immediately. Under the old practice, there might have been, and probably was, a leak of some kind at all times, but as it seldom amounted to more than a drop or splash it was allowed to evaporate and no attention paid to it. This was due to the imperfect methods then in vogue for connecting the waste-pipe to the waste-basin, and to the wide gaping crevice between the waste-basin and the marble-slab. The old, original common overflow wash-basin, like the closets of the present-day, was connected to the waste-pipe by means of a putty-joint. The putty forming this joint soon dried out and broke away, then when hair, lint, matches and other materials formed a mat on the dip of the trap, so as to retard the flow of the waste water, it would back up through this common overflow connection, and the patent overflow, with its gasket joint. Owing to the thinness of the putty, it was impossible to work the joint up very tight, and the packing or gasket soon grew hard and brittle from alternate wetting and drying, and became a permanent nuisance. But the worst source of trouble perhaps was where the bowl joined the marble basin-slab. A few months seemed to be the limit for this joint to hold together, then the plaster of paris fell away, the nuts loosened on the basin clamps, and the basin dropped, leaving a yawning abyss of darkness visible beneath. Well do I remember seeing the old wooden enclosure around a lavatory in a newspaper-office torn away, and the entire space beneath, almost to the bottom of the earthenware-bowl, one slimy mass of soap that had run together in a disgusting mass. The gap in the wash-basin was so wide that soap would slop out of the printers' hands through the opening to the space beneath, and the splashing water did the rest.

But that state of affairs was done away with in less than a year. Manufacturers of plumbing fixtures put on the market such a superior line of goods that the old putty and gasket joints, together with the plaster of paris seam, were pushed out, as it were, over-night, never to return, so that it is doubtful if in the future many safe wastes will be called for. However, we must safeguard the future with knowledge gained in the past, and as a common sin against sanitation was connecting the safe-waste direct to the soil-pipe, a prohibition of that method of installation might well be incorporated in every code. It takes but little space and prevents ignorance or cupidity taking advantage of the omission. The section having to do with this subject might go a step further and tell just where the safe-waste shall discharge, and in what manner it shall be run.

When we come to the system of refrigerator-wastes, on the other hand, we have an entirely different state of affairs. At the time the safe-wastes were in vogue, refrigerator safes and drips belonged to the unknown. Now, however, there is not a hotel or institution of any kind, private house or apartment of any pretention, that is not fitted with a system of refrigerator-wastes. New York has taken care of the subject in this way:

"Safe and refrigerator waste-pipes must be of galvanized-iron, and be not less than 1¼ in. in diameter, with lead branches of the same size, with strainers over the inlets secured by a bar soldered to the lead branch.

"Safe waste-pipes must not connect directly with any part of the plumbing system. Safe waste-pipes must either discharge over an open, water-supplied, public-placed, ordinarily-used sink, placed not more than 3½ ft. above the cellar-floor.

"The safe waste-pipe from a refrigerator must be trapped at the bottom of the line only and cannot discharge upon the ground or floor. It must discharge over an ordinary portable pan, or over some properly trapped water-supplied sink, as above. In no case shall the refrigerator waste-pipe discharge over a sink located in a room used for living purposes.

"The branches on vertical lines must be made by Y fittings, and be carried up to the safe with as much pitch as possible.

"Lead safes must be graded and neatly turned over beveled strips at their edges.

"Where there is an offset in a refrigerator waste-pipe, in the cellar, there must be clean-outs to control the horizontal parts of the pipe.

"In lodging-houses the refrigerator waste-pipes must extend above the roof, and must not be larger than 1½ in., nor the branches smaller than 1¼ in.

"Refrigerator waste-pipes, except in tenement houses, and all safe waste-pipes, must have brass flap valves at their lower ends."

In Minneapolis the section of the code relating to refrigerator wastes is short, and to the purpose. It strikes first at the practice of connecting the refrigerator waste to the drainage system, sweepingly prohibiting such a connection, then briefly states what will be acceptable. The provision follows:

"No refrigerator or other receptacle in which pro-

visions are stored or kept shall be connected with a soil, drain or vent-pipe, or discharge upon the ground beneath the building, but in every case the waste from such refrigerator or receptacle shall be provided with a trap and shall discharge into an open sink, tray or other fixture which is properly trapped."

New Orleans permits the waste-pipe from a refrigerator safe-pan to be connected direct to the soil or waste-stack. There are other peculiarities about this code which will bear reproduction. The principal sections follow:

"Sec. 48. Every safe under any fixture shall be of lead, slate or marble, and drained by a special pipe not connected with any soil, drain or sewer pipe, nor connected with safe waste from other floors, but each must discharge separately into an open water-supplied sink, or upon the yard outside of the house, in such a way as not to create a nuisance. The inlets of such pipes to be protected with heavy brass stringers, and the outlet by flap-valve. Urinal platforms shall not be provided with safe wastes.

"Sec. 49. The drain-pipe from refrigerators shall not be directly connected with the soil or waste-pipe, or with the drain or sewer. It shall discharge into an open pan, with air-space between the pan and the refrigerator, this pan to be trapped and counter-vented before entering a waste-pipe. Wastes from refrigerators in residences need not be connected to sewers as above specified unless required by the owner or the agent of the property.

"Sec. 50. Sinks under bar-counters, and all drains such as pumps, refrigerators, etc., in a bar, may be connected indirectly through deep cast-iron sinks with extra-heavy cast-iron trap waste, or to a catch-basin in the yard or an open running-trap, with vent; or a slop-sink properly trapped and vented, may be installed, no more than 35 ft. from any bar-fixture, as the conditions may suit best. Each fixture shall be trapped, the waste tested, and shall conform to other regulations governing drains. The above does not include any fixture in the bar-rooms away from the counter, such as wash-basins, urinals and similar fixtures."

A valuable feature of this code is the extent that it goes in the matter of drains. In the first section cited, it takes up and satisfactorily disposes of safe wastes from fixtures. It is doubtful if in other cities it would be necessary always to extend a separate line of pipe from the fixtures on each floor, in order to obtain a sanitary installation. In tall apartment buildings many stories in height, this would lead to a multiplicity of pipes expensive and cumbersome, while equally satisfactory results can be obtained from a single line of pipe. However, for the conditions that obtain in New Orleans, if there is any unnecessary requirement, they have erred on the side of safety.

The second section cited, contains a requirement it is hard to see the wisdom of. That is, the direct connecting of the waste-pipe from refrigerator pan to the soil or waste-stack. Perhaps, though, on second thought, the requirement is all right on geographical grounds, being perfectly safe there while it would not be in a northern city, and is but another example or illustration of the different conditions that obtain in the several sections of the country. That provision of the code no doubt is based on the assumption that ice-boxes will always be in service, consequently the trap properly sealed with water. As the climate there is extremely warm both winter and summer, the assumption is a reasonable one, and the provision seems a sound one from a sanitary point of view. Copied in the northern part of the United States, on the other hand, it would be fundamentally wrong, for in cold climates there might be several months at a time when no ice whatever would be in the ice-box. Another point to notice in that same section is that all refrigerator and ice-box traps must be protected from siphonage, by back-venting. In every way they have treated the ice-box pan as a small shallow sink which will have discharged into it a certain amount of water every day.

Analyzing the third section cited, it would seem as though sanitation would be better served by connecting the bar, the back bar, and all the subsidiary drains around the bar, direct to the drainage system through a properly trapped waste-pipe. Certainly the trap in the waste-pipe from a bar will be kept well sealed with water, for there is not a fixture in any class of building, perhaps, more freely used during the day, nor for a longer period of time during the 24 hours. It cannot be siphoned, if properly installed, and even though it were occasionally, it would be sealed immediately. In it the water never has time to evaporate and dry out, for it is constantly being flushed; then why should not the tank at a bar be looked upon and connected just like any other ordinary sink? Again, in many saloons a gutter with running water extends the full length of the bar in front. This is in many ways a floor-drain, with this distinction, however, where the ordinary floor-drain is but occasionally flushed with water, this drain is daily, hourly and sometimes steadily flushed. Such a drain then partakes more of the nature of a water-supplied sink or fixture, and the best way of connecting it is through a properly trapped waste-pipe to the drainage system. There is no sense or reason in discharging the filth from this source into an open sink to befoul it, and necessitate daily cleanings.

San Francisco adopts the indefinite and unsatisfactory form of specifying what shall not be done. Section 56 has this to say about ice-boxes and filters: "Water filters, ice-boxes or refrigerators shall in no case be directly connected to or with the sewerage or drainage system, but they may be directly connected, provided the manner of connecting be approved by the board of health."

What will the board of health approve? What do they consider satisfactory methods? In the compiling of a plumbing code the object is to point out, in words if possible, by illustrations if necessary, just how the various parts of the work must be done to meet with approval. It is assumed that there are many who will engage in business who are not skilled designers of plumbing installations, yet, by the very force of circumstances, will be called upon to do work for which no architectural plans have been drawn. To impose upon those unfortunates the further burden of having to read the minds of the various members of the board of health, is wrong in principle, and wrong in the code.

Another Railroad Yarn.

The next time Mike Harty was talked to he seemed surprised that his story had been considered remarkable. "I'll say to you," said he, "that many more wonderful things than that have happened. I came down on a through freight from Lafayette one night and we made no stop until the watering tank here was reached. The con went back over the train checking up and discovered a car gone. It was in the middle of the train at Lafayette but was nowhere to be found here. Subsequent investigation showed that when passing the Wea tank the car had jumped the track, snapped the coupling, and run down a siding. The back end of the train closed up the gap and the run was made in safety and without the train men's knowledge of the car. Isn't that true, Gilbert?" and agent A. L. Gilbert said "Yes, sir. I remember the incident well. This car has recently been discovered on a farm where the owner of the farm had taken it and was using it for a granary."

Humidity, Its Necessity and Benefits*

By Dr. W. W. Brand, Health Officer, Toledo, O.

In America two causes are operative in rendering it difficult to protect the health of the public.

One is a lack of real knowledge on the part of the public in regard to the scientific truths which underlie the conservation of its chief asset, namely, its health, and the other is a tendency in the preservation of individual freedom to lose sight of our obligation, to respect the rights and privileges of others who may be less assertive.

It is probable that each of these factors may operate as the cause of the other, and it is difficult to discuss one without encountering complications dependent upon the other. Endorsement of public health protective measures in a general way by an individual has usually the mental reservation that may be so applied as to safeguard him against his neighbor, but not in such manner as to impose hardships upon him for his neighbor's benefit.

The spread of accurate knowledge and the universal application of the Golden Rule are both to be advocated as necessary to secure permanency in the support by the public of the provision and enforcement of logical regulations, which is at the present only to be had under the stress of great fear and is then but temporary and spasmodic. Individuals and families are willing to submit to nearly every course of treatment or to any strictures imposed when the fear of sickness or death suddenly confronts them, but very quickly adjust themselves to conditions if they are prolonged and when the strain is removed, forget the lesson learned and the promises made. The public acts in the same way and is willing to submit to discipline only when the necessity for it is plainly demonstrated by epidemics with high mortality or in the face of striking disaster. If such times could be utilized for the formulation and passage of logical regulations and the public could be induced to stand up for the continuous administration of such measures, that is, to take the same interest in the protection of its health as of its wealth or honor, progress would be rapid.

It becomes necessary to convince the public, therefore, that health is its most important possession, that it can be conserved and improved just as accurately and certainly as any other asset, and that prevention is immensely cheaper and more efficient than curative procedure. In our country where the right of the individual is the primary consideration, there is a particular prejudice against the assumption of special or expert knowledge on the part of individuals or groups of people and yet it is necessary in the government of people by themselves that there should be specialization so that responsibility may be wisely placed and the greatest good to the greatest number ensured.

Gentlemen, you belong to that class of men, who are laboring to establish conditions favorable to health. You must, therefore, help to bear the burden of responsibility in matters concerning the public health, and your support of measures intended to safeguard humanity is usually misunderstood and misjudged because the honesty of purpose is questioned when you endorse methods, which if logically carried out, will diminish your financial resources.

It is surprising how little attention and thought has been given by architects and engineers to the condition known as humidity, or the state or quality of being moist. If you will inspect the heating systems of school houses, office buildings, theaters, etc., you will find, as a rule, absolutely no provision for keeping or producing moisture in the air. The air will be hot and dry, resembling the air of the desert, and physicians will tell you that such conditions are not conducive to good health.

The relation between temperature and humidity is an intimate one.

The amount of water that can exist in the gaseous state depends on the temperature. The higher the temperature the greater the possible humidity; the lower the temperature, the lower the possible humidity. Water exists in the gaseous state at all observed temperatures.

Temp. Deg.	Number of grains of aqueous vapor in a cubic foot.
100	13.8
90	14.8
80	10.9
70	8.0
60	5.7
50	4.1
40	2.8
30	1.9
20	1.2
10	.8
0	.5
-10	.3
-20	.2

This table shows the actual weight of water that can exist as a gas at some of the ordinary atmospheric temperatures.

The amount of moisture in the atmosphere in a building will be governed by the temperature, by the nature of the evaporating surface, and by the rate at which the humidity is carried away.

The humidity of the atmosphere is referred to under two captions, absolute and relative humidity.

By absolute humidity is meant the real amount of water existing as vapor in a unit of space.

By relative humidity is meant the ratio that the amount of vapor actually present bears to the amount required to saturate the space at the given temperature.

Relative humidity is usually stated as a percentage, saturation being taken as 100, and is simply a relation between the temperature and the absolute humidity. The absolute humidity of the air, though limited in its quantity by the temperature varies but slowly and the variation is less with a rising temperature, because the increase in temperature does not affect in any way the form of humidity. But, as the temperature falls, a point is reached when the space will be saturated, and then a change of form of the moisture takes place, condensation occurring, and best, the so-called latent heat of evaporation is set free, which raises the temperature somewhat and checks its fall for a while.

This fact of moisture liberating heat during condensation is an important factor in the retardation of cooling, and can be put to an economical use in the heating of buildings. The amount of evaporation depends on the temperature of the space into which the vapor escapes. The higher the temperature of the space the more vapor it can contain.

The rate of evaporation depends on the temperature of the evaporating surface, the humidity and the velocity of the air-current.

The temperature of the evaporating surface determines the velocity with which the vapor molecules escape from the surface, the higher the temperature, the greater the velocity. The lower the atmospheric humidity the more rapidly will the molecules escape into the space, and the higher the velocity of the air-current, up to a certain limit, the more rapidly will the escaped molecules be removed out of the way of others.

* Paper read before the second annual convention of the National District Heating Association, held at Toledo, O.

Many humidifiers have been evolved to produce humidity in buildings, as yet the most practical for houses heated by hot water or steam is the one designed by your President, as it conforms to the laws governing evaporation. Concerning the need of insuring a normal amount of moisture in the air of heated buildings there is more or less difference of opinion, but the weight of evidence from a medical standpoint, and from our own sensations, points to the advisability of introducing an amount of moisture sufficient to bring the relative humidity of the air to 50 or 55 per cent.

When out-door air is heated so as to maintain an even temperature of 70 deg. F., but with no addition of watery vapor, its capacity for absorbing moisture is very much increased, and it will take it up from all moist objects with which it comes in contact. It will take it from the skin, as rapidly as it is eliminated so that only insensible perspiration occurs, but with a high relative humidity evaporation is retarded and the skin remains constantly wet.

Great humidity, by interfering with the normal heat regulation of the body may indirectly favor the taking of colds and the development of many of the infectious processes, but a normal humidity will have the exact opposite effect.

To return, air heated to 70 deg. F., without vapor, will take moisture also from mucous membranes of the nose and mouth, and the respiratory tract, from furniture made from wood, which in the process of kiln drying, was never brought to such dryness; from the leather bindings of books, causing them to crack and fall to pieces, and from plants, which in consequence wither and die. It thus causes more or less dryness of the skin, irritation of the throat and cough.

It causes also need of a higher temperature to give the same sensation of warmth and comfort as in the case of air containing a normal amount of moisture.

A cubic foot of air at 32 deg. F. can contain at the most but 2.1 grains of moisture; at 98 deg. F. it can contain 18.7 grains. A cubic foot of air inspired at 32 deg. F. or below is warmed upon the respiratory passages to about 98 deg. F. and is expired, saturated with moisture and it takes from these passages 16.6 grains of water.

If this moisture be not supplied rapidly enough by the naso-bronchial mucous membrane, dryness and mechanical irritation result, and this may be sufficient predisposition of the soil for the germ, with resultant pneumonia, etc.

In the building of the American Bell Telephone Co. in Boston, a building having a capacity of 450,000 cu. ft. and a day-time population of more than 450 persons, the air which is distributed by the mechanical system is drawn into the building at the rate of 26,000 cu. ft. per minute heated to about 100 deg. F. in the stock room, and moistened so as to contain about 50 per cent relative humidity.

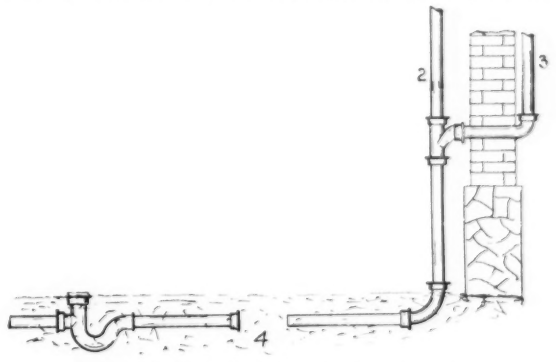
For the production of this condition no less than 675 gal. of water in the form of steam, are given to the air in 10 hours, or about one and one-half barrels per hour. Certain parts of the building which before the adoption of this process had been heated with some difficulty, are now made more comfortable, and in the whole building 3 deg. less heat are required for the maintenance of an agreeable temperature. Another feature indicating the greater comfort of the building was the absence in winter of the coughing by those employed there, a cough of the bronchial and laryngeal variety.

With a relative humidity of 50 in our buildings fewer cases of pneumonia, bronchitis, catarrhs and colds and other diseases of the respiratory organs, will present themselves to the physician. Also with such a humidity in our school-rooms, the children will have less trouble with their nasal, mouth and throat mucous membranes and there will be a greater efficiency in their studies, due to the greater comfort.

AN INSPECTOR WANTED.

By W. H. Wakeman.

Several years ago I bought a house with no modern improvements. A plumber was engaged to install a water-closet in an appropriate place. The pipes were laid, as shown in the illustration. The water-closet discharged through pipe marked 2, while rain-water from a portion of the roof came down through pipe 3. The horizontal pipe was laid under the cellar-floor and covered with earth. One evening after he had left for the



Sketch Showing Need of a Plumbing Inspector.

night, I became suspicious that the job was defective, consequently I dug up the cellar-floor and found a gap about one foot long as shown at 4. It was covered with a piece of old tin, and in my opinion was considered finished by the plumber. Of course he explained that he intended to dig it up and put in a piece of pipe to complete the connection, but he did not state why he covered it with earth, and it could not be used until the upper works were finished. This experience in connection with his unsavory reputation, of which I was informed later on, convinced me that he intended to leave the job as shown, and the defect might not have been discovered for years. Acting as my own inspector prevented this dangerous defect from being overlooked.

The Hughes Heating & Plumbing Co., 1514 East Franklin Ave., Minneapolis, Minn., is taking the first stab at 1912 business by sending out to its prospective customers an easily-read calendar, from which a man can make a date 50 ft. away, and a neat pocket-memorandum book bearing in gold letters the compliments of the company. W. W. Hughes, head of the concern, believes in advertising, and as he is doing it well, he finds that it pays.

A Terrible Revelation.

He—"At last we are alone, and I have an opportunity to speak. I have been seeking this moment for days and days, for I have something to say to you."

She—"Go on, Mr. Harkins."

He—"I will. Miss Jones, you perhaps have not noticed that at times I have been constrained, uneasy, even awkward, in your presence, that I have had something on my mind that I felt I must say to you."

She (softly)—"Yes.

He—"That constraint, that awkwardness, Miss Jones, was due to —due to—"

She—"Go on, Mr. Harkins."

He—"Was due to the fact that I feared you were not aware that I am engaged to your mother."

AN IMPROVED SYSTEM OF HOUSE-DRAINAGE.*

By S. H. Donnelly, Assistant Engineer and Drainage Surveyor, Letchworth, Garden City, England.

It appears to be generally conceded that some further advance in the methods of dealing with the drainage of habitable buildings will be necessary before anything approaching an ideal condition is arrived at; and the system here described is the outcome of a desire to assist towards the attainment of this happy, though somewhat remote, conclusion.

There is no intention on the part of the writer to add to the discussions on that much-debated question "Interceptor or no interceptor?" so he will not for the present attept to interfere with the tenure of this rather questionable guardian of the people's health, but will confine himself to problems which are more easy of solution and which would appear to have been forced into the background by the keen interest displayed in controversial matters such as that above mentioned.

It is not claimed for this system of drainage that it is original in its entirely, though it is hardly probable that the combination as a whole was in use previous to it adoption at Letchworth (Garden City) about three years ago.

The system, it will be noticed, differs from what is usually considered to be in accordance with the best practice, in that all manholes or inspection chambers —with the exception of that for giving access to the interceptor—are dispensed with.

This departure from the beaten track will doubtless be subjected to some criticism, but a very little consideration will convince the real inquirer that the practice of inserting manholes at every possible point along a line of drainage is open to many objections which obviously cannot occur in a system carried out on the lines here laid down.

The growing tendency to elaborate in the construction of house drainage seems to the writer—and there are prabably many who share this opinion—to have the effect of adding to the difficulty of securing a perfect condition, as well as so much waste of effort and expense. For, if an absence of anything in the nature of a complication in the design of a building is desirable anywhere, it is surely in the drainage system.

It will be admitted that the chief reason for the inclusion of manholes in a system of drainage is to give access to the drains when cleansing is necessary, or when stoppage occurs, and incidentally to provide for testing the various tributary drains for soundness, when it is found requisite to do so.

The following description of what may be termed the "rodding-eye" system will show how this is accomplished by quite a simple arrangement, which at the same time gives greater all-round efficiency and effects a considerable saving in cost over the "manhole system" of drainage. The more important details are made clear by the accompanying sketches.

Commencing at the boundary of the property an interceptor of the closed pattern is fixed, and a manhole built in much the usual way—of good bricks and cement mortar—but not rendered. The interceptor is provided with two screwed or clamped air-tight stoppers, one for access to the sewer, and one for the drain. The fresh-air inlet pipe passes direct from the outer atmosphere to the house-side of the trap, which must, of course, be the same diameter as the drain. It is strange that there are still a number of otherwise well-informed persons who prefer to fix a 6-in. interceptor to a 4-in. drain, the reason given to the writer in one instance being that the larger trap would "hold more." Filth! it is presumed was meant.

The main-drain is then continued at the minimum gradient of 1 in 40 or 1 in 60, as the case may be, picking up any branches on the way, until the first change of direction is reached. Here, instead of the usual manhole a rodding or cleansing eye is constructed. A junction pipe, having a well-rounded branch with a radius of not less than 2-ft., is fixed, the branch continuing the line of the main-drain, while to the straight portion of the junction is added a 2-ft. radius bend and pipes, extending upward and forming the shaft of the rodding eye.

The shaft terminates 8 in. below ground level with an airtight stopper. Round the stopper a small protecting pocket is formed in brickwork or concrete about 1 ft. 3 in. by 10 in., a cast-iron frame and cover of the same dimensions finishing to ground level. The cover should be hinged or chained to the frame, and have the words "drain rodding eye" cast on in plain letters. The pocket should be well rounded inside with cement, and the stopper socket should project several inches above the base (see Fig. 1).

The second line of drain is then led off from the junction branch, an easy bend being added if necessary to keep an even curve. At each point along the line where a branch drain is to join a junction is inserted, the radius of 2 ft. being strictly adhered to.

The main-drain eventually terminates at the last fitting on the line, which may be a waste-pipe gully, vent-shaft, ground floor water-closet, or a soil-pipe, preferably one of the two latter if it can be arranged, as this ensures a flush of fresh water at frequent intervals passing along the whole of the line.

So much for the main-drain. The various branches are carried from each junction in a direct line to the fittings to be served, the branch joining the main always in a down-stream direction. The bends used for connecting up to the fittings are of the radius mentioned as far as possible, but certainly never less than 1 ft. 6 in.

Provision for rodding each branch is made in the following manner:—

In the case of the waste-pipe gullies a special fitting with an air-tight stopper on the crown of the trap, as in Fig. 2, is the best arrangement there being several excellent types on the market.

The soil-pipe drain is provided for by an iron junction at the foot of the soil-pipe, having a branch at an angle of about 140 deg., with a screwed or clamped cap (see Fig. 3), though the writer imagines that this will seldom —if ever—be needed if the instructions relating to bends and junctions are followed and the pipes properly laid and jointed.

Ground-floor water-closets have a rodding eye on the crown of the trap similar in some respects to the one referred to for waste-pipe gullies, but the removable stopper in this case must be absolutely permanently air-tight and proof against carelessness in fixing, or interference by irresponsible persons, as these fittings frequently occupy positions in the main building.

There are several basins on the market having rodding eyes with screwed or clamped stoppers, the writer having had experience of both these types.

During the installation of this system of drainage to a certain factory building at the Garden City, however,

* Reproduced by courtesy of "The Surveyor," London, England.

an engineer who was otherwise much in favor of the arrangement put the following question regarding some water-closet basins with clamped stoppers: "Assuming that the stopper is perfectly jointed when the installation is complete and ready for use, can you garantee that in case of its removal it will be replaced in a similarly perfect condition?" The writer was, of course, obliged to admit that he could give no such assurance, and being suddenly confronted with this evident defect, he was compelled to exert himself to find a remedy, with the result that a closet-fitting has been designed having a cleansing eye which gives protection against the stopper being carelessly fixed or tampered with by ignorant persons.

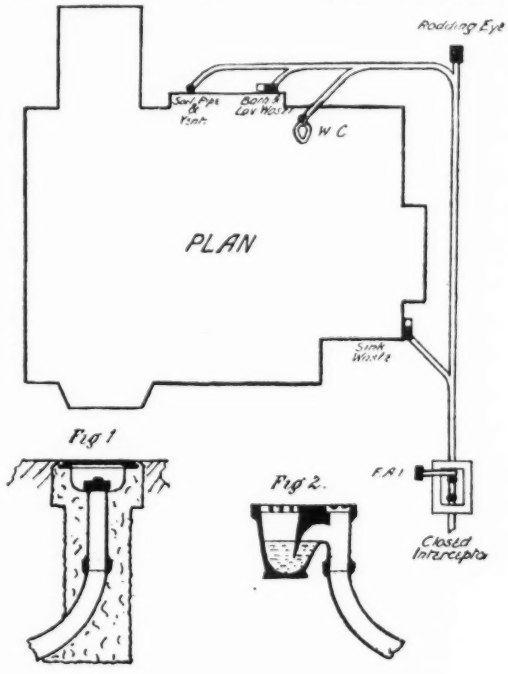


Fig 1

Fig 2.

Fig 3

Fig. 4.

The device is quite simple, as will be seen by reference to Fig. 4. A tubular connection is formed between the flushing nozzle and a channel formed round the cleansing eye, so that each time the closet is flushed water-pressure is applied to the inside of the stopper joint; and in the event of the stopper being removed or the point insecurely made, a portion of the water escapes as a "tell-tale" and draws attention to the defect.

In a modification of the design a water-seal is also formed round the stopper, but this has a disadvantage in exposed positions and is more costly. The additional cost of the first type over the ordinary fitting is trifling.

There are a number of these fittings already in use at Letchworth, and they have proved in every way satisfactory.

The details regarding such matters as the necessity for concreting certain parts of the work, jointing, etc., would, of course, be according to recognized methods. It would be necessary to concrete round an outside rodding eye, and at any point where the pipes have not sufficient cover.

Testing a new installation before covering in is carried out in the usual manner by inserting plugs at the low points and charging the pipes with water. Testing for leakage in an old installation may be done by inserting a suitable bag stopper by way of the rodding eye controlling the portion of the system under test. The bag is attached to light drain rods, and has a sufficient length of flexible tube for inflating. By this means the stopper may be placed at any point along the line to be tested and leakage easily located by charging the pipes with water to the required level.

This completes the information necessary for carrying out a scheme of drainage on the lines advocated, which the writer suggests as an alternative to the method usually adopted, but he would emphasize the point that in order to obtain the maximum efficiency the instructions given should be closely followed, particularly in regard to the radii of bends and junctions employed, which must not be less than those mentioned—namely 2 ft. and 1 ft. 6 in.

The accompanying sketches refer to a scheme for a small house built at Letchworth, but the system is even more advantageous as applied to drainage schemes for large houses, blocks of cottages and factory buildings etc., where stoppages are usually frequent.

Concluding, the advantages of the rodding-eye method over a system of drainage with manholes may be briefly stated to be:—

1. Reduction in the length and area of the whole system, resulting in a decreased fouling area, and a more direct removal of waste matter conveyed.

2. Better ventilation is possible, due to reduced cubic capacity.

3. Reduced possibility of leakage, as manholes are obviously not so impervious as pipes, and are seldom perfectly water-tight for any length of time, especially at the channels.

4. Stoppage is less likely, as all branch connections are made with closed pipes, in a more down-stream direction and at a much larger radius than is usually possible in entering a manhole sharp bends being always avoided.

5. In the event of stoppage there is a more rapid accumulation of head than in the case of a system with manholes, which would probably have the effect of automatically clearing any slight obstruction, and failing this the defect is quickly made apparent and is readily removed, rodding being more easy of application to every point, and always down-stream. In the case of the manhole system days, and even weeks, are occupied in gradually filling up the manholes along the line. Meanwhile the cause of the trouble becomes more difficult to remove, and the condition of the manholes affected and the atmosphere about them is more easily imagined than described.

6. The whole system can be made perfectly air-tight without difficulty, due to the small area of the rodding-eye stoppers, which also are not affected by traffic over them, as in the case of manhole covers. These latter are seldom air-tight.

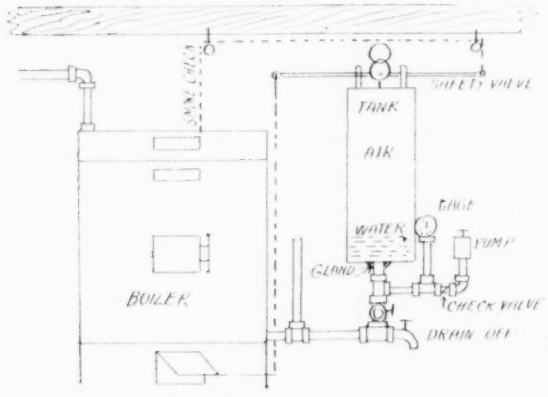
7. Finally the initial cost of the installation and the expense of maintenance are considerably less than in a system with manholes.

THE WALTERS AERO-BALANCE SYSTEM OF HOT-WATER HEATING.

Our readers will be interested in the study of the ingenious system invented by Felix Walters, Highfield, Md., known as the Walters Aero-Balance system of hot-water heating. Environment has a great deal to do with the development of character and systems. This heating device was the result of considerable planning to overcome the difficulties in heating inseparable from mountainous locations exposed to high winds and low temperatures.

The expansion tank in this system is placed alongside of the boiler and in combination with which there will be noted a system of damper and draft-control in conjunction with the other specialties. The first plants were installed in 1910. Practice brought about several improvements resulting in the complete system shown.

The tank holds 20 gal. The pipe connecting the bottom of the tank with the boiler-return has a valve to



A Walters Aero-Balance Installation.

cut off such connection when desired. The top of the tank has a lever safety-valve on it and an attachment for operating a lever-arm that closes and opens the draft-door of the boiler, and a check-draft damper on the smoke-pipe. On the side of the tank attached to the draw-off there is connected a small air-pump similar to those used for obtaining a pressure in gasoline fire-pots, and alongside of it on the same run there is connected a pressure-gage.

In operation, the valve on the line between boiler and tank is closed, the system filled with water as usual and then about 10 gal. of water, or 2 buckets, are drawn off; the air is pumped into the tank until, for a 2-story house, the gage registers about 5 lb., for a 3-story house, about 8 lb., and so on. The object of this is to have enough pressure to balance the height of water in the system so that the top radiators are kept full of water. When this is done the valve between the tank and the boiler is open and the gage will register about zero. Fire is then started and the system operates by means of the adjustable weight on the damper-arm at the tank. The draft can be set to close off at any pressure desired. From 4 to 10 lb. have been used at the gage.

The system is said to be extremely sensitive to the action of the fire, the circulation being very rapid and equal. The most distant radiator from the boiler obtains its heat almost simultaneously with that nearest the boiler. As soon as pressure in the system exceeds the amount desired, water from the system enters the expansion-tank and this increases its weight. This causes it to drop through a gland-joint in the connection between it and the boiler and in dropping it tips the damper-lever arm, causing the draft-door to close and the check-draft in the smoke pipe to open. As soon as this excess-pressure subsides, the tank goes up to its original position and the above conditions are reversed. The entire drop of the tank is only one-half inch. The fulcrum and lever-arm multiply the distance of the tank-drop sufficiently to positively operate the draft and check. This draft-control has proved to be efficient. The inventor claims that the amount of radiation usually required is reduced from 10 to 15 per cent as compared with the open system of hot-water heating; smaller mains, risers and radiator connections are used. Experiments have been made with high pressure, as high as 30 lb. at gage, without showing any leakage through the system.

MARKED IMPROVEMENT IN THE STEEL-TRADE.

A much broader market developed during the week and all kinds of iron and steel products were in better demand. The American Steel & Wire Co. announce an advance of $1 per ton in wire products and the leading independent manufacturers of sheets also advanced their quotations $2 per ton. Small merchants and jobbers all over the country exhibited considerable haste in replenishing their depleted stocks and the buying for immediate delivery was large. The manufacturers of cars have bought steel freely and have been in the market for steel and iron castings to a considerable extent. Most of the increase in the volume of business is found in and around the Pittsburgh district, there being comparatively little new demand for finished products in this eastern market. Buyers of pig-iron have filled their requirements for the first quarter of 1912, but many of the largest consumers are anxiously testing the market for later deliveries. They feel that since the largest outside buyers have purchased so freely that they may need all of their resources during the second and third quarters of 1912.

Prices show little change and are quoted as follows:

No. 2 Southern foundry, Birmingham	$10.00
No. 1 Northern foundry, New York	$15.00 to 15.25
No. 2X Northern foundry, New York	14 to 15.00
No. 2 Northern foundry, plain, New York	14.50 to 14.75
No. 2 Northern foundry, Chicago	14.00 to 14.50

OLD IRON.

The demand is broader but there has been very little improvement in prices and it will be difficult to secure higher quotations until material is scarcer or inclement weather interferes with gathering it.

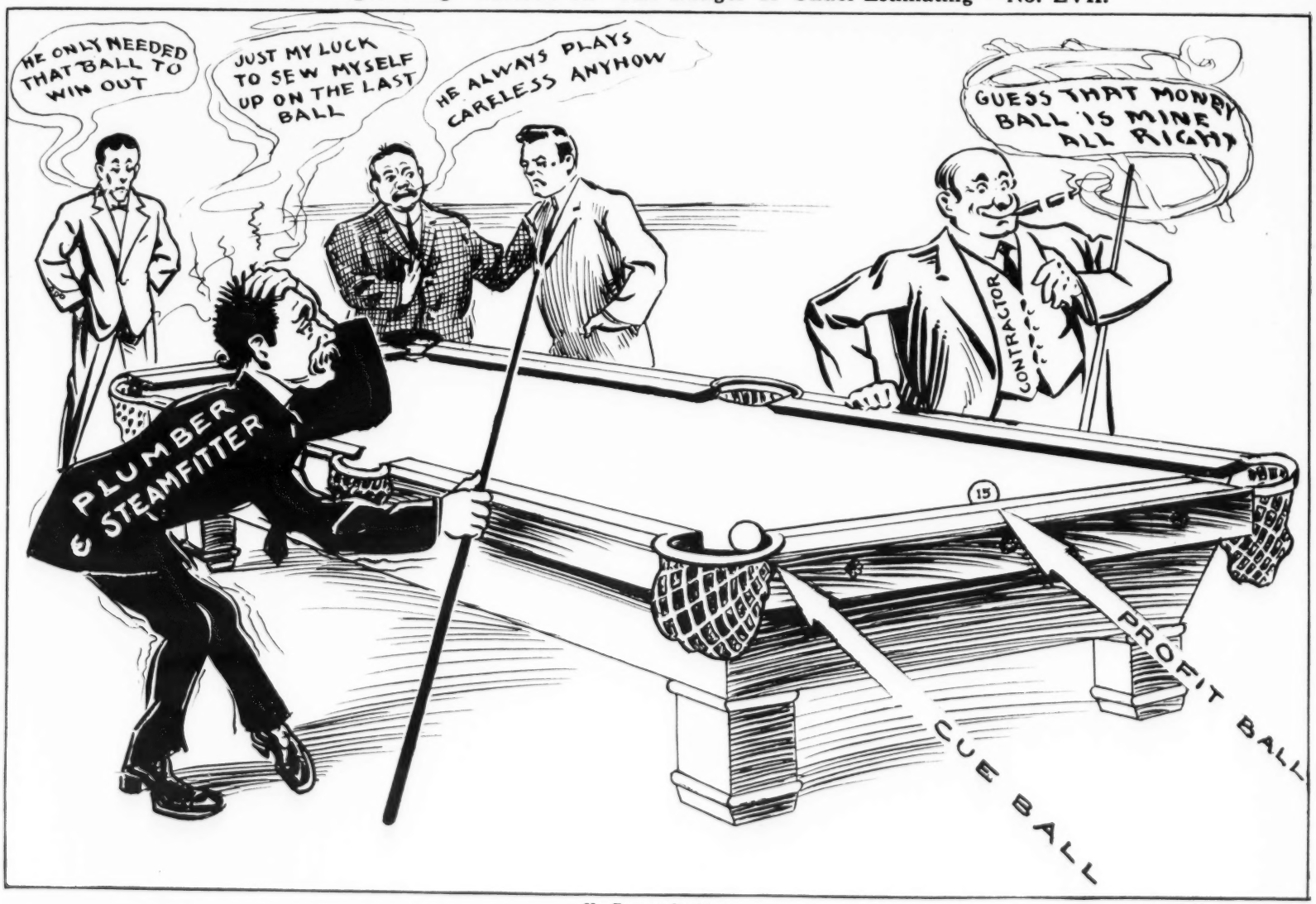
Quotations per gross ton in New York are as follows:

No. 1 yard wrought, long	$10.25 to $10.75
No. 1 yard wrought, short	9.25 to 9.75
Heavy-melting steel scrap	9.50 to 10.00
Machinery cast	10.75 to 11.00
Wrought pipes and tubes	9.75 to 10.00
Malleable castings	10.00 to 10.50
Wrought turnings	6.50 to 6.75
Cast borings	6.00 to 6.25
Stove plate	8.50 to 8.75
Light iron	4.50 to 4.75

LARGE BUYING OF COPPER.

Consumers in Europe as well as the United States continue to buy copper freely, even though the price has advanced to 14 cents. It is strange, although true, that in spite of the large buying by American melters that they have not fully covered their requirements for January and February, but they have not. The statistics compiled as of Dec. 1 were favorable to holders of the metal, but it looks as though those of Jan. 1 would be fully as favorable.

"Domestic Engineering" Cartoon on "The Danger of Under-Estimating"—No. LVII.


HE ONLY NEEDED THAT BALL TO WIN OUT
JUST MY LUCK TO SEW MYSELF UP ON THE LAST BALL
HE ALWAYS PLAYS CARELESS ANYHOW
GUESS THAT MONEY BALL IS MINE ALL RIGHT
CONTRACTOR
PLUMBER & STEAMFITTER
15
PROFIT BALL
CUE BALL

He Forgot Position

There's lots of folks that you know that sew themselves up on the Profit Ball. They need this cartoon as an educator. You can send this to them for New Year. We will supply you with a dozen upon request, free of cost, or more if you wish.

ANNUAL MEETING OF THE NATIONAL ASSOCIATION OF BRASS MANUFACTURERS.

The National Association of Brass Manufacturers held its annual meeting at the Hotel Astor, New York City, December 13 and 14. The meeting was well attended, and among other matters taken up for consideration, the following resolution was passed:

Whereas, The making of net prices is harmful, tends to demoralize the market and drive prices and values to a lower level, therefore be it

Resolved, That the National Association of Brass Manufacturers hereby agrees to discountenance and discontinue the making of net prices in so far as it lies in its power to do, and to urge all manufacturers to discourage and discontinue this harmful method of doing business, and instead to quote, sell and invoice goods from the regular lists and discounts, as has been the custom for years.

The following officers were elected for the ensuing year: Theodore Ahrens, Louisville, president and chairman Board of Trustees; trustees: A. S. Hills, Haydenville, Mass.; D. H. Roberts, Detroit, Mich.; C. C. Hale, New Haven, Conn.; W. H. Wasweyler, Milwaukee, Wis.; Fred Sommerville, Toronto, Canada; J. W. Sharpe, jr., Philadelphia, Pa.; delegate to the National Comittee: H. M. Hoelscher; commissioner: W. M. Webster.

The meeting adjourned to meet in Chicago on March 19 and 20, 1912.

THE PRODUCTION OF SANITARY WARE IN THE UNITED STATES DURING THE LAST 10 YEARS.

In 10 years the production and consumption of sanitary pottery such as is used in all kinds of plumbing work, has shown the remarkable increase of $3,881,346. In other words, in 1901 the sanitary potteries of the United States produced and sold ware to the value of $2,877,650. In 1910, which is the last fiscal report issued, the value of the production reached the enormous figure of $6,758,996.

But a still greater growth is shown when the records of 1909 and the fiscal reports of 1910 are compared. The total of the production for 1909 was $5,989,295, while that for 1910 was $6,758,996, a gain in production in twelve months of $769,701 or 12.85 per cent. In speaking of sanitary ware, only lavatories, bath tubs, water-closets etc., are considered in this statement.

The record of production of sanitary ware for the 10 years from 1901 to 1910 are given officially as follows:

Year	Value of Production
1901	$2,877,650
1902	3,555,662
1903	3,362,263
1904	3,585,375
1905	4,580,145
1906	5,098,310
1907	4,863,222
1908	4,373,590
1909	5,989,295
1910	6,758,996
Total	$45,044,688

Sanitary ware is now produced in eight states, but in four of these states, the total production of sanitary ware was valued at only $134,576. In the value of production the various states are officially announced as follows: New Jersey, $4,955,066; West Virginia, $618,868; Indiana, $468,301; Ohio $327,438; Pennsylvania, $254,747, total production valued at $6,758,996. This is 20 per cent of all the pottery products of the United States; 3.97 per cent of the total clay products of the United States, and all produced by 38 manufacturers or firms who have made confidential reports of their business.

While there were nine states making sanitary pottery in 1909 there was no increase to this list in the fiscal year ending June 30, 1910. When New Jersey alone is considered, this state during the current term produced $614,026 more sanitary pottery than it did in 1909. This is an increase for the 12 months of 14.14 per cent.

West Virginia gained $118,436 in total value produced or 23.67 per cent over 1909.

Indiana was the third producing state. The number of individual producers increased 3 in 1910 over 1909, but not in the different states reporting.

This increase in the production and sale of sanitary pottery products is due to several reasons: The effort of the home-builder to possess a greater amount of sanitary conveniences about his home; the greater use of sanitary ware in public buildings and hotels, and the efforts of architects, builders and dealers to impress upon the public the great need to have such improvements in the individual home.

Ohio will show a greater value in the production of sanitary ware in 1911 than heretofore, due to the fact that a new sanitary pottery was started in the Columbus district, by the Sanitary Earthenware Specialty Co., of Trenton, N. J. This company during the last season bought the Bell Pottery Co.'s plant and has placed it in operation, in conjunction with its property in Trenton.

In West Virginia, the Wheeling Sanitary Manufacturing Co. has increased its kiln and manufacturing capacity, and the fiscal reports for the current term will show a greater production in that state.

Indiana will also be another state to show an increase, this being caused by the formation of the Helfrich Pottery Co., at Evansville, Ind.

The use of sanitary pottery is increasing. In the last 10 years, a loss in value of production is shown only in two years—namely—1907 and 1908, the "off years." Since then, however, the increase has been steady and gradual All in all, there was made and sold in 10 years in the United States, on an average of $4,500,000 worth of sanitary ware annually.

WOULD LIKE TO REPRESENT MANUFACTURERS OF HEATING GOODS IN ITALY.

One of the commercial agents of the Department of Commerce and Labor reports that an Italian civil and electric and mining engineer, having high professional and financial standing, is prepared to represent American manufacturers of steam and hot-water heating apparatus. Correspondence may be in Italian or French. Address Bureau of Manufactures, Washington, D. C., referring to File No. 6,909.

TRADE LITERATURE RECEIVED THIS WEEK.

The J. L. Mott Iron Works, New York City, has just issued supplement No. 6 to its plumbing catalog describing the "West Point" siphon water-closet and two new pamphlets illustrating and presenting the company's closets with porcelain cisterns, and Mott's sanitary drinking nozzles. This recent literature is well worth consideration by the purchaser of sanitary

apparatus. The "West Point" closet is substantial in construction, sanitary in its flushing and when equipped with a "Boston" vent, makes provision for a sanitary odorless water-closet. A copy of this literature can be obtained upon request to the company.

PERSONAL MENTION.

Frank Lindenberg, who managed the Columbus Brass Works, Columbus, O., until a few years ago, has again come into the chair and from now on will occupy the position of manager.

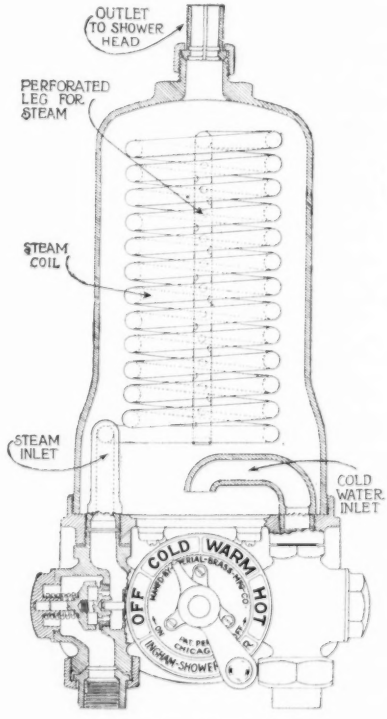
A CHRISTMAS REMEMBRANCE.

A. Wyckoff & Son Co., Elmira, N. Y., is playing Santa Claus to its customers with a neat vest pocket memorandum-book bound in brown leather. This will advertise the company's steam-pipe covering, chain pumps, well curbs and castings and other products most effectually during the year 1912.

THE INGHAM SHOWER-MIXER.

The use of shower-baths is steadily increasing. In early days, the shower conveyed to the average mind only two sensations—a dreadful chilling feeling down the spine or the sensation of being fried alive in boiling oil. In fact, many showers are unable to give any other sensations than those. Nevertheless, courageous people shower themselves with alternate "tropicality and frigidity" and exist on their nerve.

With the improvements of all sanitary apparatus it was natural that the shower-bath should receive consideration also. One of the most interesting developments in this direction is the Ingham shower-mixer, manufactured by the Imperial Brass Manufacturing Co. Chicago. It is a direct attempt to reconcile extreme temperatures, and a study of its method of doing so is really quite interesting. As will be seen by the outline of the sectional view presented, the Ingham shower-mixer is simply a cylindrical bell-shaped metal jacket, made in different sizes according to capacity desired. It is attached to a cast metal base-plate through which project two special valves connected respectively to the cold water and steam or hot-water pipes.



The Ingham Shower-Mixer.

The cold-water valve delivers the cold water through a bent spout to the center of the base-plate. The pressure carries the water up through the mixer-cylinder to the outlet at the top, from whence it flows to the shower-head.

On the right-hand side the steam or hot-water is delivered through the valve directly to a copper coil or worm. This coil runs almost to the top of the mixer-cylinder and then, as is seen by the dotted central line, runs straight down through the center of the coil as a straight leg. This leg is perforated with holes about half an inch apart, through which the steam or hot-water is sprayed directly into the cold water. Thus, the temperature of the cold water is raised, not only by its contact with the steam or hot-water coil, but by direct and intimate mixing with the spray from the central leg of the coil.

So far the mixer has only presented an ingenious and well-proportioned heating apparatus, but it has in addition a most ingenious mechanism which gives an absolute control of the adjustment of temperature by the bather. When the mixer is installed a maximum temperature is always determined by the prospective user.

Opinions concerning high temperatures differ, but an average choice is about 110 deg. F. In making the installation, loose key-valves, about 12 in. below the special mixer-valves, are provided, whose function is to make a permanent adjustment so that the maximum amount of water and steam necessary will be admitted to the mixing chamber. First the flow of cold water is determined and then the volume of steam or hot-water required to raise the cold water to the maximum temperature desired.

The mechanism through which any adjustment of temperature can be obtained by the Ingham shower-mixer instantaneously may be described as a compound cam operating on the stems of both the cold water and steam or hot-water valves. The cam consists of two members, the greater member controlling the cold-water valve and the lesser controlling the steam-valve. The members are of such shape and dimensions that the first turn of the lever-handle opens the cold-water valve but the stem of the steam-valve remains in its original closed position. By a perfectly graduated contour the movements of the valve-stems are so controlled that the temperature can be raised or lowered degree by degree at the will of the operator.

The Imperial Brass Mfg. Co. issues a descriptive booklet describing the mixer, its construction and application in close detail, a copy of which can be obtained upon application to the company.

NOT PUBLISHED BY US, BUT WE SELL IT.

We frequently have requests for information concerning matters pertaining to "Engineering Directories." Our correspondents are evidently under the impression that "Domestic Engineering" publishes this work. We desire to advise our correspondents that "Engineering Directories" is published by the Crawford Publishing Co., Ellsworth Bldg., Chicago, to whom all such communications should be addressed in future, so as to prevent unnecessary delay and confusion. We would also mention the fact that "Engineering Directories" is advertised in "Domestic Engineering," and is supplied by our Book Department in the same manner as other books listed by us.

Servant's Room Should Be Heated.

A New England man says that one night last winter, when the thermometer fell below zero, his wife expressed her concern for the new Swedish maid, who had an unheated room.

"Elza," said she to the girl, remembering the good old custom of her youth, "as it is bitterly cold to-night, you'd better take a flat-iron to bed with you."

"Yes, m'm," said Elza, in mild and expressionless assent.

In the morning the girl was asked how she passed the night. With a sigh she replied:

"Wall, m'm, I gat the iron most varm before morning."
—Harper's Weekly.

NEW ENGLAND NOTES.

Massachusetts.

Ware.—Moriarty Bros. have been awarded the contracts for the plumbing, heating and gas fitting in the new Kaplan building which is in course of construction at the corner of Main and North streets. The same firm also has the contract for similar work in the new local hospital addition.

Fitchburg.—D. J. Whooley & Co. have a contract for remodelling the blower system in the chair factory of John A. Dunn at Gardner.

Great Barrington.—F. L. Wright is installing a new hot-water heating system and bath-room in the home of Mrs. W. Heburn on upper Main street.

New Hampshire.

Portsmouth.—The county commissioners of Rockingham county have awarded the contract for the plumbing in the new county jail at Brentwood to M. L. & C. H. Brewster of Portsmouth.

Franklin Falls.—William Trottier has been awarded the contract for the plumbing of a new school building to be erected at Conway. The heating contract has been placed with the Kidder Machine Co. Mr. Trotter is just completing the installation of shower-baths, hot and cold-water systems and lavatories for the gymnasium at Proctor Academy and has in hand a contract for plumbing Ernest Burleigh's new house on Willow Hill.

Connecticut.

Bridgeport.—The contract for the plumbing and heating in the new building which Dr. A. C. Fones is erecting, has been placed with F. & F. C. Booth.

Carlson & Benson have the plumbing and heating contracts for two new six-family houses which are being erected on East Main street for Mrs. Harvey Harding.

The contract for the plumbing and heating in the residence which Mrs. John Broadhead is erecting on Vine street has been awarded to W. J. Shadecki.

T. O. Johnson will build a new two-family house on Fox street and has placed the contract for plumbing and furnace-heating systems with Carlson & Benson.

New Haven.—The contract for the plumbing in the new building which is being erected on Poplar street for the First Swedish M. E. Church has been let to Charles Smith.

Bristol.—Roberts & Arnold, plumbers and stove dealers, have incorporated their business under the name of the Roberts & Arnold Co. The incorporators are L. R. Roberts, C. W. Roberts and W. H. Arnold. The capital stock is $50,000 of which $10,000 is paid in.

Waterbury.—The plumbing in Angelo Pace's new store and tenement block is being done by W. H. Lowe.

Greenwich.—Joseph F. Gross & Co., of New York City and Baltimore, have opened a plumbing establishment and salesroom at 384 Greenwich St. In the past the firm has handled a number of large contracts in Greenwich and at the present time is engaged in plumbing, steam-fitting and ventilating work in several local residences. The local office is in charge of Walter J. Joyce who has superintended several of the jobs done here in the past.

Rhode Island.

Pawtucket.—The school committee has awarded the contract for plumbing and heating the new north-wing of the high school building. The plumbing goes to the Samuel Jackson Company and the heating to the Blackstone Heating Company. Both were the lowest bidders in their respective line.

Vermont.

Lyndonville.—Ernest Martin and Fred L. White have formed a partnership for the conducting of a plumbing and hardware business in this town. The new firm is styled Martin & White. Mr. Martin is reputed to be one of the best plumbers in Eastern Vermont while Mr. White has been clerk in a local store for the past seven years. They have bought out the hardware store of B. J. Aubin and added plumbing to the business.

Vermont.

Manchester.—Charles E. Wills of Troy, N. Y., is making arrangements for opening a plumbing establishment in this town soon.

NEWS FROM PITTSBURGH AND VICINITY.

Pittsburgh, Pa.—The possibility exists that ere long a uniform method of submitting bids will prevail throughout the Pittsburgh district. The Manufacturers' and Contractors' Club has appointed a committee composed of Joseph A. Weldon, of the plumbing firm of Weldon & Kelly, to confer with a committee from the Architects' Association with this end in view. In the past almost any method of preparing bids has been followed by contractors, but the plans now on foot are expected to result in a regular business system being adopted.

Pittsburgh, Pa.—The University of Pittsburgh, in connection with its recently organized Department of Sanitary Engineering, will give a series of lectures on this trade during January and February. Men of national prominence will be secured to give these lectures.

Pittsburgh, Pa.—The Pittsburgh Heating Co. has been awarded the contract for heating the new $75,000 Presbyterian church at Bellevue, Pa.

Pittsburgh, Pa.—Considerable interest is being evidenced here over the meeting in this city next May of the Ohio Society of Mechanical, Electrical and Steam Engineers. The dates selected are May 16-17-18. The convention probably will meet in Carnegie Institute or in the lecture halls of the Carnegie Technical School.

Pittsburgh, Pa.—A. F. Maxwell, of the Pittsburgh Gage & Supply Co., has just been made chairman of the Credit Exchange Bureau of the Pittsburgh Association of Credit Men. The committee is one of the most important maintained by the association.

Pittsburgh, Pa.—The McGinnis Co. has been awarded the heating contract in the new $125,000 Y. M. C. A. building now going up at New Castle, Pa.

Contracts Recently Awarded.

A number of favorable contracts for heating, lighting, plumbing and ventilating recently awarded in the Pittsburgh district are:

Pittsburgh, Pa.—Weldon & Kelly Co., plumbing in six residences being built in Wilkinsburg, by G. G. O'Brien.

Tarentum, Pa.—Hazlett Plumbing Co., plumbing in new $3,500 residence of Charles D. Myers.

Johnstown, Pa.—Bailey Bros., plumbing and heating contracts in $8,000 residence for F. M. Shaffer.

New Kensington, Pa.—M. Lancelot, plumbing and heating in $3,500 residence being built at Arnold by Mrs. Keller of this city.

Parnassus, Pa.—Masters Plumbing Co. will do the plumbing in $42,000 school being erected here by the Central Board of Education.

Greensburg, Pa.—The West Latrobe Foundry & Machine Co. has been given the contract for the plumbing in the new $30,000 baggage and express-room being erected by the Pennsylvania railroad here.

THE TRI-STATE MASTER PLUMBERS ASSOCIATION.

Wheeling, W. Va.—It is expected that monthly meetings will soon be resumed by the Tri-State Master Plumbers' Association, an organization which was formed at meetings held in East Liverpool and Steubenville, O., last winter. The officers of the association are, President, Robert R. Cox, Steubenville, O.; vice president, William Hare, Wheeling, W. Va., secretary-treasurer, W. S. Meighen, Steubenville. This association has a membership of nearly 100 master plumbers in the town along the upper Ohio Valley from Rochester Pa., down the river to Parkersburg, W. Va., and into Central Ohio from counties bordering along the Ohio River.

PACIFIC COAST LETTER

San Francisco.

Local plumbing supply-house report a decided lull in business this week. The approaching holidays and the fact that few new large buildings are being commenced naturally causes a slack demand. All, however, are extremely optimistic for the new year. It is expected that when the new city officials take office in January, many contemplated projects will be begun without further delay. Mayor-elect Rolph has issued an invitation for local architects to submit ideas for the civic center plan, which feature of the World's Fair of 1915 will be most prominent. It is also practically assured that grading work will be commenced at Harbor View, which is a part of the Fair site, right after New Year's. The Fair work actually started, much construction work of a private nature will follow immediately.

Plumbing and heating firms are fairly busy at present with jobs on hand and there is considerable figuring on new work throughout the Coast, espscially to the north and south of San Francisco.

In the last year a considerable increase of trade in plumbing supplies for the Hawaiian Islands and the Orient has resulted from new sanitary laws enacted, especially in Honolulu. With the awakening of the Orient this trade is sure to grow enormously. Last week a ship loaded with sewer-pipe left here for Honolulu. The new sanitary regulations of that city call for the draining of numerous cesspools, etc. Several local jobbers are doing a good business with Honolulu, notably the R. W. Kinney Co. and makers of bath-tubs such as J. M. Kohler Sons Co. and the Standard Sanitary Manufacturing Co.

The Morris Stulsaft Co. have now completed their removal into their handsome new building at 159-163 Second St. The stock of this company is arranged as follows: On the first floor are the general offices and salesrooms for marble fittings and brass goods; on the second floor is shown their line of bath-tubs and boilers; on the third floor, lavatories, and on the fourth floor, toilets. The basement is devoted to castings. Two doors east on Natoma St. they have a warehouse for extra stock in boilers and piping. The new establishment is modern in every respect, equipped with freight and passenger elevators, etc. After the first of the new year this firm will place a traveling salesman on the road.

The Glafke company, on Second street, manufacturers of oil burners, valves and certain kinds of plumbing fittings, are installing their oil-burners in numerous plants and expect to see a big increase in their output next year.

H. F. Finch, of the local branch of J. M. Kohler Sons Co., is contemplating a trip the first of the year over the Coast territory. He will also visit the factory in the East before his return, and in all will be gone about six weeks. Mr. Finch states that he has been having splendid success on the Coast with the new "Universal" bath manufactured by his company. This bath is made in five different styles and is popular for hotels and high-class apartment houses.

The Western Heating Co., the new contracting firm whose offices are in the Monadnock Bldg., are to make a specialty of drying and humidifying work. L. F. Halloran, one of the partners, reports that already they have landed a big contract, that of putting in a tile drying system for the Gladding, McBean Co's. plant at Lincoln, Cal. This system is thoroughly up-to-date and consists of fans, steam-heating coils and automatic regulation. The Western Heating Co. has the agency for Northern California for the National Automatic Heat Regulation.

The Turner Co., San Francisco, has been awarded the contract for the plumbing and heating work of the new building at Mission and Marye streets, a 4-story structure owned by the Scott & Van Arsdale Co. Amount, $8,884.

At the recent meeting of the Board of Education, Stockton, Cal., bids for work on the new Weber grammar school were opened, but the contracts have not yet been awarded. The following bids were for heating and ventilating: Brandt Bros., $3,750, without oil burner, and $600 more with burner; Pacific Blower & Heating Co., $4,250 and $900; W. Morgan & Co., $4,600 and $900; Murray & Co., $5,224 and $604; Atlas Heating & Ventilating Co., $4,950 and $872.

The Pacific Gas & Electric Co., the South Side Light & Power Co., the Consumers Light & Power Co. and the Municipal Light & Power Co. all have underground systems which supply buildings in the vicinity with steam for heating purposes, in this city.

William S. Snook, for many years senior member of the prominent local plumbing firm of Wm. S. Snook & Son, died December 7, at his home in Berkeley, Cal., aged 85 years. Mr. Snook was a pioneer of California, being the last survivor of the party which came around Cape Horn in the ship "Tamaroo" in 1849. He was a member of the Masonic order, and of the society of California Pioneers. Mr. Snook has resided in Oakland for the greater part of his life in California, moving to Berkeley in 1906.

Jem Willets' Luck.

Jem Willets was here when th' land was all slough
Where th' depot is now an' th' railroad runs through;
He owned a hull forty 'o townsite, by gum,
An' let it all go fer th' taxes, I vum!
He could have bought Perkins' Addition, I guess,
Fer twenty-five dollars, an' mebbe fer less;
An' he was once offered th' hull block of land
Fer a span o' gray mules, where th' courthouse'll stand!

Jem Willets says somehow it's always his fate
To be too durn early or else be too late;
Th' steam cars stop now on th' way goin' through
Where he used t' cut hay 'fore they drained out th' slough.
Jem Willets says nobody'd ever have thought
A depot'd be built on so durn wet a spot;
An' he let it go fer a song, an' I vow
She's wuth nigh a thousand an acre right now!

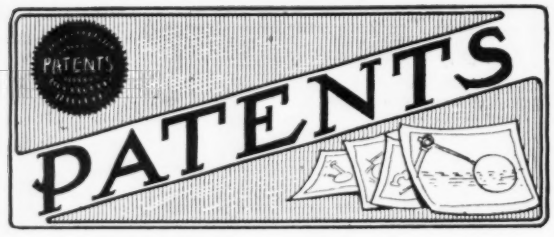
Jem Willets, he says, where th' school board has bought
Was offered t' him fer two dollars a lot,
An' sold fer two thousand th' week before last,
Which runs inter profit, Jem says, purty fast.
Ef he'd only known what th' future'd bring
He'd be wuth a million this minute, by jing!
'Cuz land sells today fer a thousand a lot
That might 'a' been Jem's jist as easy as not!

"Who'd ever 'a' thought," says Jem Willets t' me,
They'd be sech a town where jist land used t' be!"
It makes him disgusted when he sees a bank
Where he used t' fill up his old water-tank.
It just goes t' show that there ain't nothin' fair
About life at all, an' th' feller that's square,
An' don't want it all, he jist stays where he is,
While schemers git money that orter be his!

J. W. Foley in "The Saturday Evening Post."

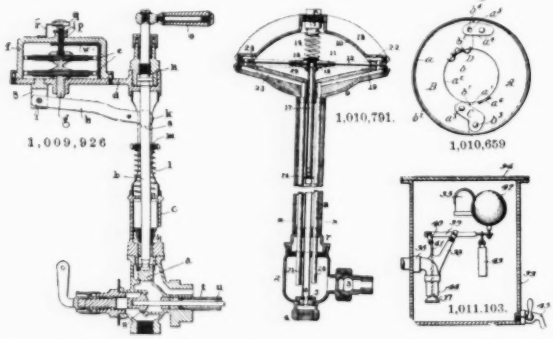
Valuable Knowledge That Was Lost.

A bright young man came into the class in electricity late. The professor called on him quickly and said, "Say, John, what is electricity?" The fellow didn't have a chance to get his thoughts together. He sat there a minute. The professor said, "Hurry up, John, you ought to know that." He rose and said, "Professor, I knew that yesterday, but you asked me so quick that it really forced it out of my mind." The professor said, "My boy, if you hadn't forgotten that, you would have been the only living being on earth that ever knew it." (Laughter.)



Heating Department.

1,009,926. Automatic Regulator for Steam and Other Heating Systems. David Mein Nesbit, Leicester, England. In a device for automatically regulating the passage of heating fluid in a heating system, the combination of a plurality of diaphragm chambers, a frame carrying said chambers, a bracket carrying said frame, a casing carrying said bracket, a spring-actuated controlling valve working in said casing, a sliding spindle carried by said valve, a lever engaging said spindle and pivoted on said bracket, a pin on one of said diaphragm chambers adapted to engage the said lever whereby the said valve is operated, a screwed spindle connected to said diaphragm chambers, a pointer secured to the said frame, a head for adjusting said diaphragm chambers, and gradations on said head co-



acting with said pointer whereby the temperature at which the valve is operated is indicated.

1,010,791. Steam-Trap. Millard P. Osbourn, Merchantville, N. J., assignor to Warren Webster & Co., a corporation of New Jersey. In a steam-trap, the combination of a body having inlet and outlet ports, and a valve-seat opening into the outlet port, a tubular valve-piece controlling the outward flow of water through the valve-seat, a diaphragm motor device for operating the valve-piece, a drainage passage-opening from the motor device close to the diaphragm and discharging into the body, a steam-supply passage-opening into the motor device above the diaphragm and also into the body at a higher level than the opening between the drainage-passage and the body, and a thermostatically controlled air-vent through the motor device and the valve-piece for permitting the escape of air but restricting the passage of steam, said controlled air-vent comprising a valve-seat bushing arranged in the diaphragm of the motor device and a thermostatic member secured to and carried by the tubular valve-piece for controlling the passage through the valve-seat bushing.

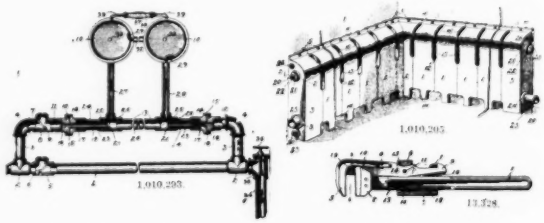
1,010,659. Floor-Plate. Frank E. McCabe and Mortimer C. Rosenfeld, Cleveland, Ohio; said McCabe assignor to the Grabler Manufacturing Co., Cleveland, O., a corporation of Ohio. A floor-plate comprising the combination with two surrounding members having two normally contiguous extremities when in their closed position; of a hinge having an axis on each of said members and adjacent to said extremities; said axes being perpendicular to the plane of movement of said members, and located in two different planes perpendicular to the line of contiguity of said extremities.

1,011,103. Vacuum Steam-Trap. Samuel Lewis Bartlett, St. Paul, Minn. A vacuum trap for regulating the operation of vacuum air-pumps, comprising an air-tight receptacle provided with an inlet-pipe and a discharge-pipe, said discharge-pipe having a downwardly extending portion within the receptacle, a valve in said receptacle arranged to rest normally against the lower open end of said discharge-pipe for restricting said open end without wholly closing the same, a float in said receptacle, and a positive connection between said valve and said float for moving said valve downwardly away from the open end of said discharge-pipe to fully open said end upon the rise of water in the receptacle.

1,010,293. Heating System. Daniel M. McLaughlin, Louisville, Ky. In a heating system, a heater, a cold-water pipe leading to the heater, a check-valve positioned in the pipe and adapted to permit the flow of water to the heater, a hot-water pipe leading from the heater, a valve interposed in the hot-water pipe, a by-pass pipe connecting the hot-water pipe with the cold-water pipe for short circuiting the water from the hot-water pipe to the cold-water pipe when the valve in the hot-water pipe is closed, a check-valve positioned in the by-pass pipe and adapted to permit hot water to flow into the cold-water pipe, and means for pivotally connecting the heater with the hot and cold-water pipes whereby the heater may be moved into and out of engagement with a fixed heating medium.

1,010,205. Base-Board Radiator. Elmer E. Van Pool and Perry J. Van Pool, Janesville, Wis. A heating radiator of substantially base-board height composed of sections each comprising a single casting having a back plate, a front plate spaced therefrom and of less height than the back plate, a top portion uniting the upper end of the front-plate to the back-plate below the upper end thereof to provide an upstanding flange, a bottom member uniting the lower portions of the front and back plates above the lower edges thereof, and side members uniting the front, back, top and bottom portions, the front portion, top portion and back portion having extensions beyond the side members, the extensions of the front and top members being recessed at spaced points along their outer edges, adjacent sections when united to form a radiator defining united air-spaces between them below the bottom members, and between the side members, with openings defined by mating recessed portions, and the radiator so formed being adapted for installation without further disturbance of a finished building than the removal of a base-board, if present.

13,328. Wrench. James F. Wright, Canton, O. In a wrench of the class described, the combination of a combined handle and shank provided with a jaw, a rock-bar provided with a jaw and a shoulder, said jaw and shoulder located at the end of the rock-bar, the face of the rock-bar adjacent to the shoulder being beveled to a point below the connection between the rock-bar and a yoke, whereby said face will be in contact with the upper surface of the shank irrespective of its tilted position, a yoke connected to the rock-bar and adapted to embrace said

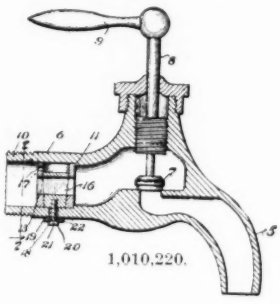


rock-bar and shank, said yoke provided with spaced loops, one of said loops provided with a convex face and the rock-bar provided with a recess and the convex face adapted to be seated in the recess, the shoulder on the rock-bar engaging the other loop irrespective of the position to which said rock-bar is tilted, a spring interposed between the rock-bar and the handle shank, and means for holding the yoke and rock-bar against longitudinal movement upon the shank substantially as and for the purpose specified.

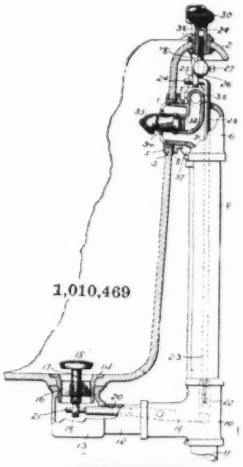
1,011,294. Pipe-Hanger. John A. Warrick, Chicago, Ill. In a pipe hanger, a pair of clamping members one of which is adjustably engaged with the other, means on said members to grip a support, a stationary pipe supporting member formed on one of said clamping members, a detachable pipe supporting member engaged with the other clamping member, and pipe receiving devices adapted to be engaged with said supporting members to receive a pipe running parallel or in line with the support.

Plumbing Department.

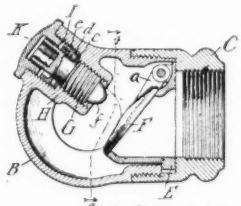
1,010,220. Auxiliary Valve for Water-Pipes. George A. Blake, Boston, Mass. In a liquid distributing system, the combination with a supply-pipe and a valve-controlled service-pipe having an inner shoulder and a lateral opening; of an apertured valve casing of greater diameter than the lateral opening of the service-pipe and wholly arranged in the service-pipe at a point between the valve thereof and the supply-pipe and bearing on the shoulder, an apertured valve-plug located in the casing, and an operating handle connected to the plug and extending through said lateral opening.



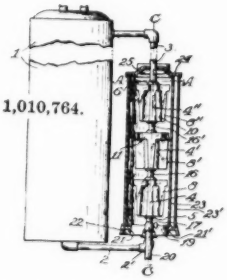
1,010,220.



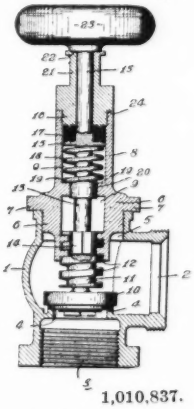
1,010,469.



1,010,547.



1,010,764.



1,010,837.

1,010,469. Bath-Tub Fitting. Henry M. Weaver, Mansfield, O. In a bath-tub fixture, the combination with a hollow casting forming an elbow and provided internally with a water-duct terminating horizontally in the central portion of the horizontal member of said casting, means for conducting hot and cold water to said duct, a screen to extend over the overflow outlet of the tub and having a threaded flange to screw on the hollow casting, a clamping washer on said hollow casting for securing the same and the screen to the tub, a nozzle passing through the center of the screen and having a nipple connecting said nozzle with the water duct within the hollow casting, and a waste-pipe communicating with said hollow casting.

1,010,547. Combined Shut-Off and Check Valve. Earl G. Watrous, Chicago, Ill. In a combined shut-off and check-valve comprising a shell having inlet and outlet connections and a check-valve for controlling communication between said connections normally resting by gravity upon its seat, means for holding the check-valve permanently to its seat comprising a screw plug having a reduced cylindrical outer end adapted to be turned by a key and threaded inner end, said inner end engaging a threaded bearing formed in said shell and adapted when screwed inward to bear against said valve and hold it to its seat, a packing-ring surrounding said cylindrical outer end of the screw plug, and a screw ring adapted to be turned by a key screwing into a threaded recess in said shell and arranged to confine said packing ring in place; substantially as described.

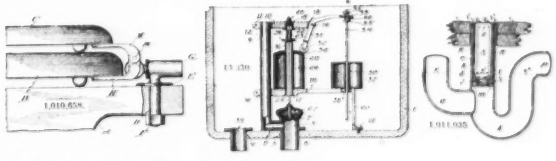
1,010,764. Water-Heater. Charles L. Holden, Indianapolis, Ind. A boiler including a shell having longitudinal branches thereon provided each with a lateral branch extending traversely thereof.

1,010,837. Valve. John B. Woodworth, Syracuse, N. Y., assignor to the Syracuse Faucet & Valve Co., Syracuse, N. Y., a corporation of New York. In a valve, and in combination, a body having a valve seat and an opening through its wall opposed to the seat, a cap mounted in the opening and provided with an axial passage therethrough, an abutment in the passage intermediate of the ends thereof, a valve within the body for coacting with the valve-seat, a valve-stem extending through the passage in the cap and having one end detachably connected to the valve and its opposite end provided with a handle, a closure for the outer end of the passage in the cap, said closure including a part extending a distance into the passage, a flange fixed relatively to the stem beneath the closure a ring surrounding the stem and separable therefrom, said ring being located in the passage of the cap and disposed between the end of said closure and the opposing face of said flange, and a spring interposed between the opposing faces of the abutment and said flange for yieldingly pressing the flange into contact with the ring, and the latter into contact with the end of the closure.

1,010,658. Hinge for Water-Closet Seats. John W. McAuliffe, Chicago, Ill. A post for a water-closet seat comprising two arms arranged at right angles to each other in the form of an L, fastening means on one of said arms for securing the post in position, the other of said arms having an elongated socket extending lengthwise thereof and adapted to lie at right angles to the transverse axis of the seat, said socket being open at the end of the arm which is adjacent to the other arm.

13,330. Flushing Apparatus. William Guyton, Avalon, Pa., assignor of one-half to Robert Stinson, Pittsburg, Pa. In a flushing apparatus, a tank having a water-inlet and a water-outlet, a valve adapted to normally close the outlet, a float arranged within said tank and adapted to elevate said valve and release the contents of said tank, movable means for normally retaining said float in inoperative position, and another float supported independently of and adapted to trip said means when the contents of the tank have reached a pre-determined level, the movements of said latter float and said means being in unison solely during the tripping operation.

1,011,035. Bath-Trap. Thomas E. Crosby, Boston, Mass. In a bath trap, an inlet-pipe, an outlet-pipe, an outer-casing, an inner-casing fixedly attached to the said outer-casing and extending downwardly into the trap to a point above the inlet-pipe, an annular base portion on the lower end of the said inner-casing extending inwardly and having an upper inner-surface and a threaded opening, a tubular member within the said inner-casing having an expanded, closed upper end extending out to the said inner-casing, an expanded lower end, an intermediate, recessed wall between the said expanded ends and out of contact with the said inner-casing, a threaded portion ex-



tending below the said expanded lower end of the tubular member, the said expanded lower end extending laterally from the said threaded portion out to the inner-casing and having a lower-surface adapted to coöperate with the said inner-surface of the annular base portion of the inner-casing.

Spreading Out.

Brownley (hanging to the edge of the platform)—Well I see that the street railroad companies, also, have adopted the 16 to 1 policy.

Parsons (sitting on the brake handle)—How's that?

Brownley—Sixteen passengers to one seat.

Classified Advertisements

Advertisements under this heading 4 cents per word per issue, address included. Remittance to be made with order. To insure insertion copy should be received not later than Wednesday morning.

Situations Open.

You may desire employees of high caliber, draftsmen of ability, or efficient salesmen. These columns enable you to discover at once all the available material in the field at the time of your need. Our advertisements bring replies from all those who make a habit of reading and studying our columns, and readers of good trade-journals are among the advanced type of men engaged in the industries we represent. Do you need somebody today? We shall be pleased to receive your advertisement.

WANTED—EXPERIENCED PLUMBING specialty salesmen for the southern, middle western and northwestern states. Address No. 743, "Domestic Engineering", 445 Plymouth Court, Chicago. 23

SALESMAN WANTED—ONE COMPETENT to solicit plumbing and heating trade in a large central city. State experience, amount of annual sales, expenses and salary expected. Good position for the right man. Address No. 738, "Domestic Engineering," 445 Plymouth Court, Chicago. 30

PLUMBING AND HEATING SALESMEN wanted by a large manufacturer and jobber, for Chicago and states of Illinois, Indiana, Michigan and Wisconsin. Address No. 742, "Domestic Engineering," 445 Plymouth Court, Chicago.

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